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# LEGENDARY LIGHTING

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- USING SVG FILES
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EDITOR'S

# WELCOME

This issue, master your renders




If you seek to create the best artwork possible you're in luck, as we have the training to get you there. Starting with our cover image, where Djordje Ilic shares his secrets to model and light a car, through to Pedro Conti's wonderful character render on page 44, not to mention a host of tips on our Q&A pages.

*Rob*

Rob Redman, Editor
rob.redman@futurenet.com

## SPOTLIGHT ON OUR CONTRIBUTORS

**Tom Box**
Tom is one of the founders of Blue Zoo and on page 34, he shows off some of the cutting-edge 3D projection work the studio is creating.
www.blue-zoo.co.uk

**EJ Hassenfratz**
EJ Hassenfratz is an Emmy Award-winning 3D artist, whose clients include Apple and Microsoft. He shows you how to create cartoon cel shading on p40.
www.eyedesyn.com

**Oscar Juárez**
Oscar is an archviz specialist, creating in many apps but has a keen interest in Unreal. He shares some of his secrets with us on page 50.
www.fibrha.com

**Pedro Conti**
As well as his work on Disney's *Moana*, Pedro created a gorgeous image for us, along with accompanying tutorial, which starts on page 44.
www.artstation.com/pedroconti

**James Morris**
On page 92 you'll find James' review of the Ryzen workstation. He draws on two decades as a technical writer, specialising in content creation gear.
www.webmediology.com

**Mike Griggs**
Mike Griggs is a 3D and visual effects artist with vast experience across the industry. On page 76 he delves into the Bridge tool.
www.creativebloke.com

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DECEMBER 2017



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© Djordje Ilic – not official Porsche artwork

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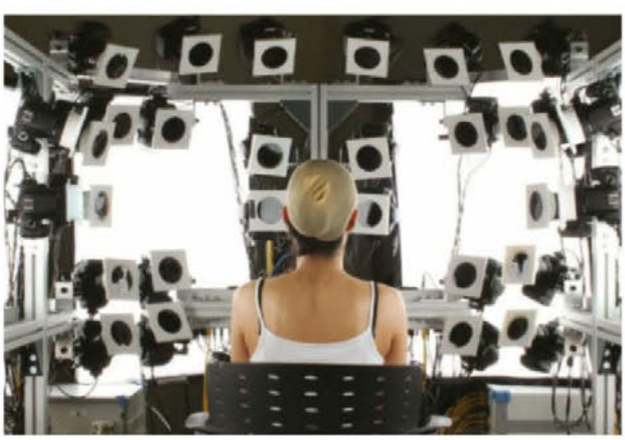

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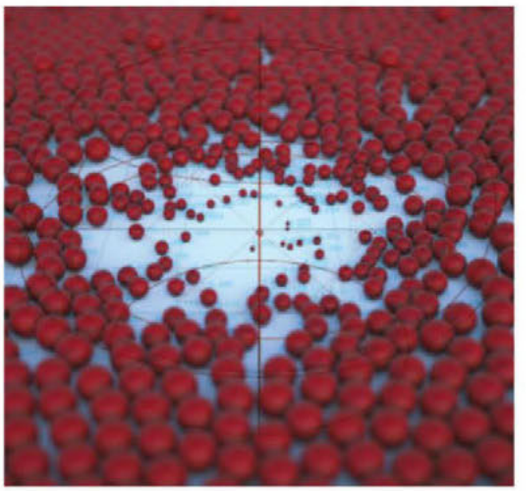

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# SHOWCASE

The best digital art from the CG community

# THE CRYSTAL PALACE 1900

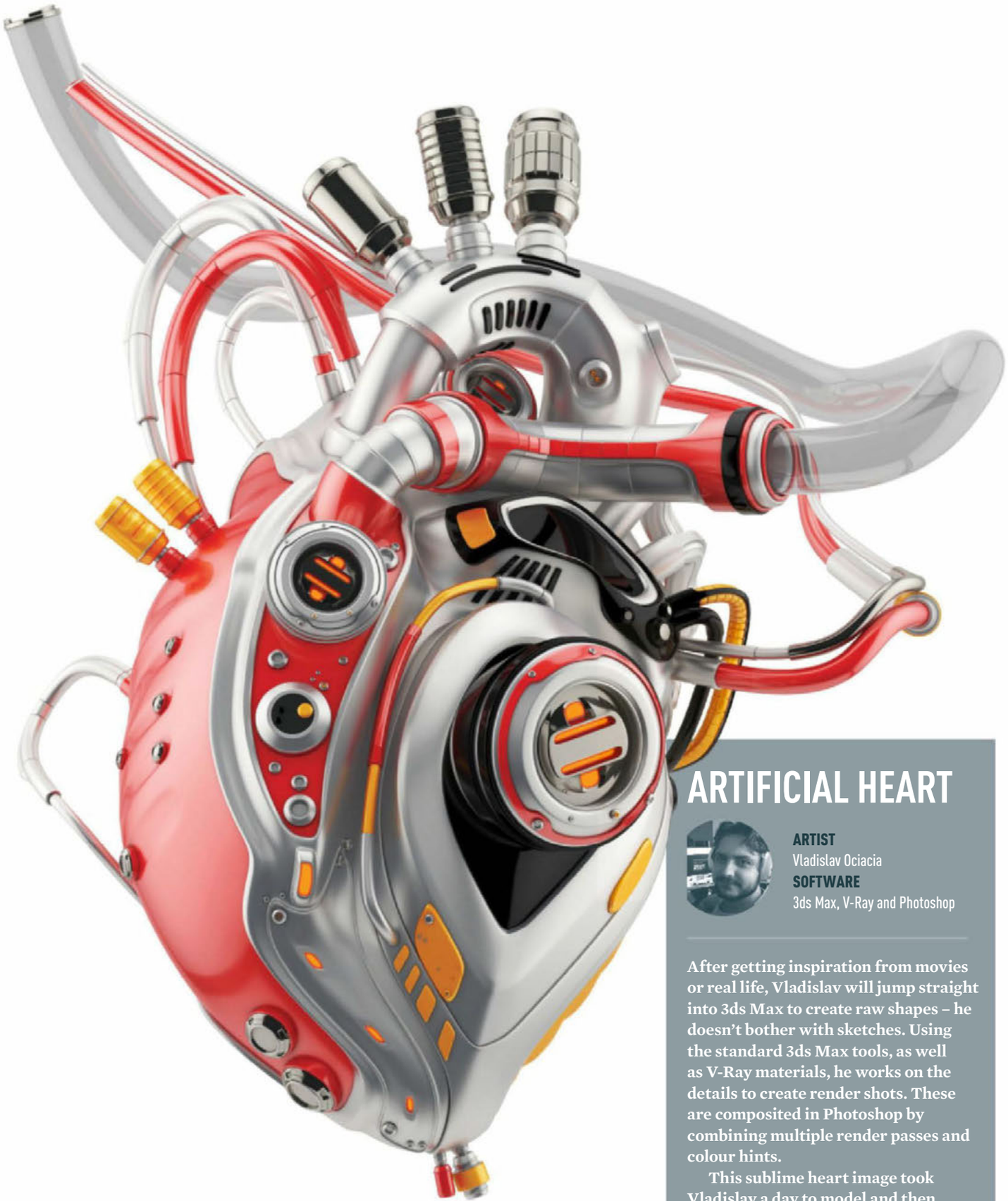
ARTIST
Simon Edwards
SOFTWARE
3ds Max, ZBrush, Marvelous Designer
OnyxGarden, V-Ray and Photoshop

**Architectural visualiser, Simon, spent roughly two months researching and creating this incredible image. The majority of the image was modelled using 3ds Max with V-Ray, plus additional ObjectID and Depth passes. As Simon explains, "ObjectID was very important in order to isolate different areas for varied treatments in Photoshop (especially with the glass) and then ZDepth was used for additional scene depth with those treatments. The scene is rendered using a V-Ray physical camera with a small amount of distortion applied. I didn't like the distortion on the high balloons so they were rendered separately and without distortion and then composited back into the scene later in Photoshop."**

**With a scene of such magnitude, you'd expect some areas to cause issues and for Simon, it was the 160 people that tested his endurance. To cope with the task, he started each character as a simple 'T' pose avatar rigged with a default biped skeleton from 3ds Max. These were exported out as obj files into Marvelous Designer as an 'avatar' to be clothed and morphed into shape using the 3ds Max posed obj – see how he did it on page 60. After exporting, the materials were reassigned to V-Ray inside 3ds Max. Simon designed five costume types for the characters, with varied textures and colours depending on the scenes they were in.**

**As to be expected, such a large scene started to drain his computer capacity and Simon found navigation and graphics began to suffer in 3ds Max. But he had a fix; "I split the whole into three separate models and then xrefed two of these back into the main model again. The building has a good deal of repetition so many elements are of course instanced to keep memory issues at a minimum."**

www.3dartvision.co.uk



# ARTIFICIAL HEART



**ARTIST**
Vladislav Ociacia
**SOFTWARE**
3ds Max, V-Ray and Photoshop

**After getting inspiration from movies or real life, Vladislav will jump straight into 3ds Max to create raw shapes – he doesn't bother with sketches. Using the standard 3ds Max tools, as well as V-Ray materials, he works on the details to create render shots. These are composited in Photoshop by combining multiple render passes and colour hints.**

**This sublime heart image took Vladislav a day to model and then another day for the render and compositing. As is the case with his other images, only the standard software tools were used.**

https://ociacia.art/

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# BREATHLESS

**ARTIST**
Domenico D'Alisa
**SOFTWARE**
Blender, Marvelous Designer, ZBrush, xNormal, Substance Painter and Photoshop

**Freelance designer, Domenico, created this image in his free time, over a couple of months. During the process, he called upon Marvelous Designer 5 to create the cloths, as opposed to modelling them in ZBrush, which is something Domenico admits he "is bad at". Instead, he finds the Marvelous Designer simulation offers him a quicker and more accurate way of working. Once finished in Marvelous Designer, he exports the high poly meshes of the cloths to bring into ZBrush, where he will fix any minor problems or add small details.**

**The texturing part of the image was via Substance Painter, which the artist feels is an "incredible tool". In fact, creating the textures was his favourite part of this image.**

**One bit of advice from Domencio is to try the xNormal baking tool. In his words; "I highly recommend it to anyone; it is fast, really intuitive and completely free!".**

www.behance.net/domenicodalisa

# MORNING DELIGHT

**ARTIST**
Dusan Kovic
**SOFTWARE**
Maya, Mari, Arnold and Nuke

**By day Dusan can be found working as lead cinematic artist at Eipix Entertainment, but like any good artist, his free time is also spent creating images. For *Morning Delight*, he abandoned his usual layer-based workflow and instead opted for a node-based workflow, taking advantage of the versatility it offered him. Over four months he got to work on his image, taking enjoyment from the process of texture painting and lighting.**

**Dusan's method for building an image involves a good amount of prep work, gathering references for the mood, lighting and objects and testing various compositions. A series of simple shapes then follows, enabling him to ensure everything is in the right position. After that, he works on the assets in detail and individually, so they can be referenced in the master scene. Then the lighting is established, the scene rendered, then composited and finally published.**

http://dusankovic.com


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# ESSENTIAL TIPS FOR REALISTIC LIGHTING

**Djordje Ilic** shares his professional techniques for ensuring your lighting truly shines

AUTHOR

**Djordje Ilic**
Djordje works as a generalist TD at Double Negative, usually focussed on lighting and the development of how projects look. When not working, he is being inspired by films, especially Korean cinematography, and music.
djordjeilicvfx.com

Lighting is fundamental in any project you work on. At the most basic level, it's a way of making objects visible. But speak to any cinematographer, and they will tell you how lighting is much more. Lighting enables you to bring mood to a piece and set the tone. It allows you to subtly manipulate the viewer to look where you want them to and draw attention to specific areas. It is also a way to elevate your work out of the 3D realm, giving the warmth of an oil painting or the feel of a photograph. And if you are modelling a real-world object – such as the highly desirable Porsche Legend 964 – it is essential you get the lighting correct if you are to stand any chance of achieving a photorealistic finish.

I worked on this project for a period of roughly four years, mostly at the weekends. It began life as a blueprint, but this only extended as far as the general shape. I was able to create a base model, but then had to employ various techniques and software to generate all the exterior and interior details. Lighting became essential in making sense of these separate elements and helped ensure there was continuity from shot to shot.

But it wasn't all practical – I had a lot of fun playing with different lighting conditions, from total darkness all the way to a scorching sunny desert. Lighting was also useful with creating the textures, as different shading methods helped emulate all the different materials found in a Porsche.

Read on and discover some of the lighting techniques I employ in my work to ensure that I get the exact result I want. Improve your lighting and you'll quickly improve your work!

**DOWNLOAD YOUR RESOURCES**
For all the assets you need go to
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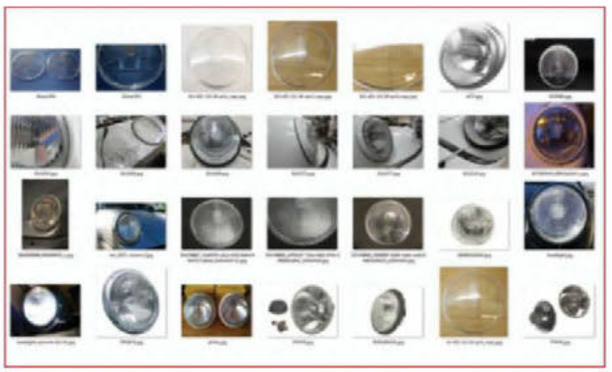
**LEGEND 964**
**Lighting is vital for photo-realistic renders and this project simply wouldn't work if the lighting was off.**



01

Get your search muscles flexing to find the most suitable references.

Modelling details with maps rather than trying to poly model is a more efficient method.

## 01 REFERENCES, REFERENCES AND MORE REFERENCES

It doesn't matter how good you think your visual memory is, do not attempt any lighting without having a good stock of reference material to work from. If you are modelling something from the real world, find photos of it that you can use. If this isn't possible, or you are creating something from your imagination, take your own lighting reference photos. Place an object on a plain surface and on a plain background, light it from one direction and take your photo. Keep moving the light and photographing the result and you will soon have a comprehensive photo reference bank for where to apply highlights and shadows for different light sources. Do the same with a transparent object, and also place more than one object in a scene so you can see how light behaves when it hits multiple objects.

## 02 USE MASKS TO LIGHT MODELS

For this image, I created a low poly model that was as simple as possible. To do this, prepare the UV and then import the model into ZBrush. Make sure that the SUV (Smooth UV) is turned on and then smooth geometry as much as you think is necessary.

Now prepare a black-and-white mask in Photoshop and import it into ZBrush as Alpha Mask. After that, use the masks to select only the parts you need. For extruding the details use inflate(Deformation).

Prepare a Dome Light setup with an hdri and then check how your model looks. In this example here, I have used a simple material without bump, because all the details came from displacement.

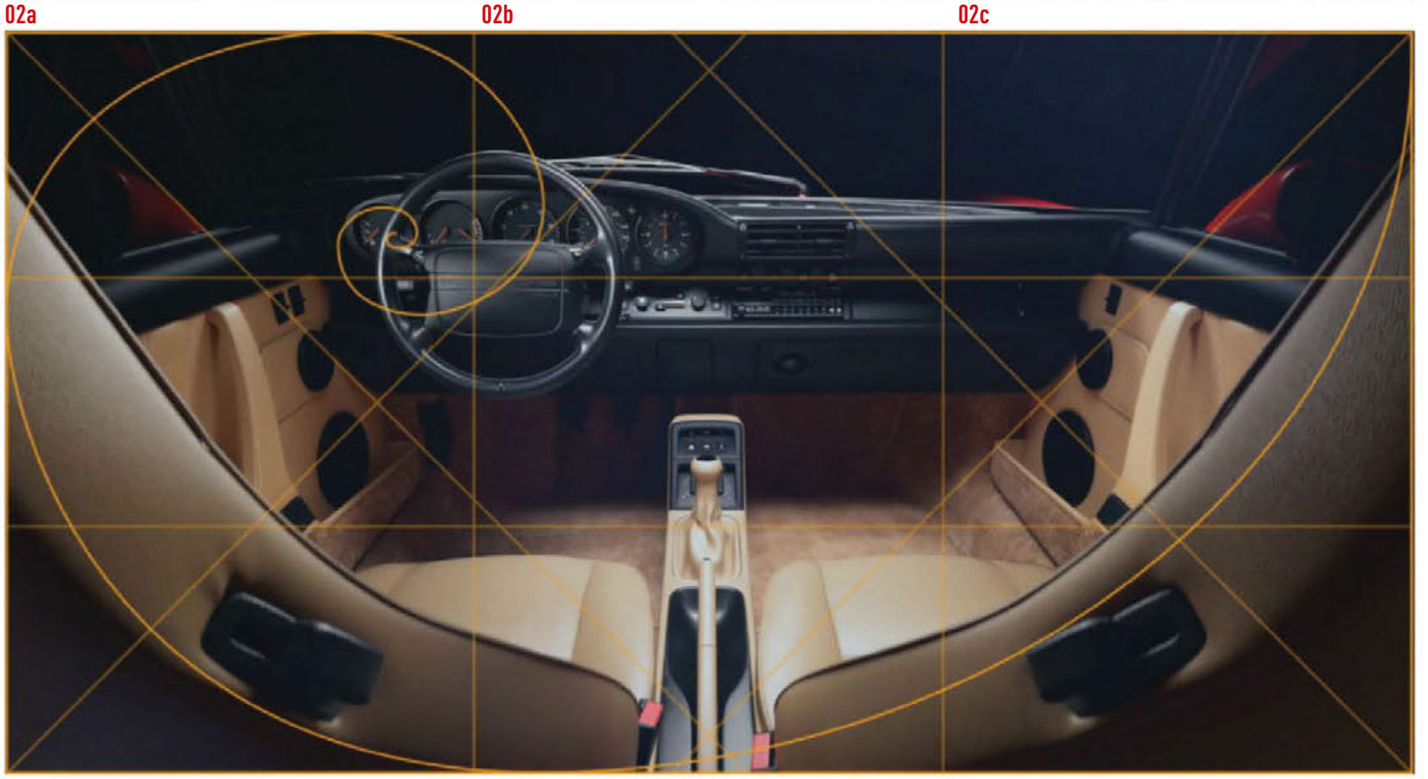
## 03 COMPOSITION IS YOUR FRIEND

Composition works with lighting when it comes to manipulating the viewer's eye and directing the attention where you want. The model and textures can be perfect, but if the composition is not good everything falls into the water. If you are struggling with composition, investigate some traditional art theory. Artists

02a

02b

02c



03

and photographers have devised all sorts of rules for successful composition, from the Rule of Thirds, to the Golden Ratio (seen here). By knowing the route your viewer's eye will take, you can then use lighting to work as support for the composition.

## 04 ADD DRAMA WITH STRONG CONTRAST

This is an excellent example of how you can focus all the attention on one part of the image by using strong contrast to create a silhouette. In this example, there is also a clear separation of positive and negative space, which helps emulate a high-end photographic quality and deliver something a bit more interesting and dynamic than just a car model.

## 05 EXPERIMENT WITH LENSES

Do not limit yourself to normal lenses (50mm). Have the freedom to combine different lenses, angles, camera movement, speed and duration. The height of the camera can change a lot and give a completely different impression, which in turn will help open new lighting opportunities you might not have considered.

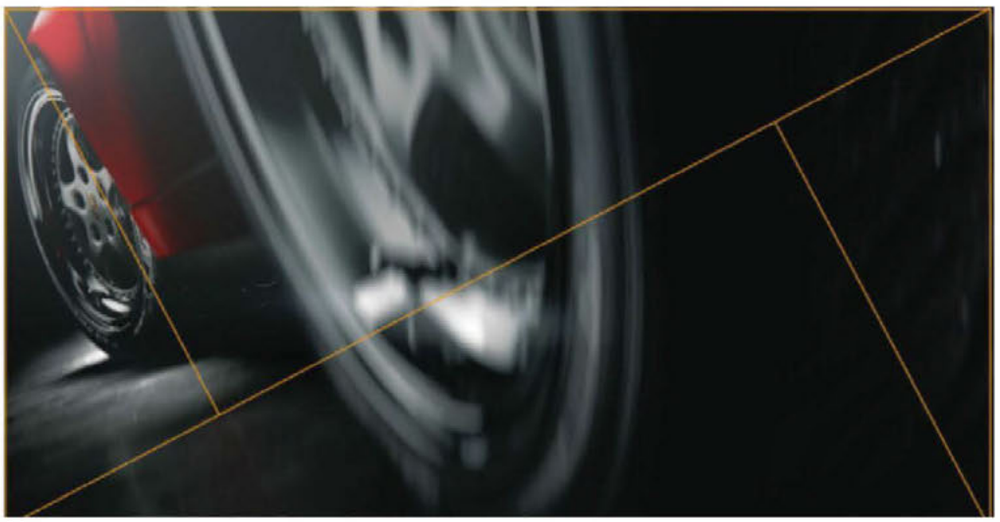
## 06 THE MAIN LIGHT

If there was no sound in a film, you would be still able to tell a story or convey the atmosphere and mood only by using lights and shadows. The main light needs to be positioned well and its shadows need to explain the shape and the structure of the scene. It can additionally influence the composition separating the positive and negative space.

Here, it would have been easy to fill the interior with light, but by placing the main light where I did, I've made it feel as though the viewer is inside the car, peering through the front seats. There is a feeling of depth and the light falling where it does accentuates the materials.

## 07 BUILD UP YOUR LIGHT

Depending on the situation and requirements, other lights are helping us to fill something else or to justify the bounce of the light... with the additional light.



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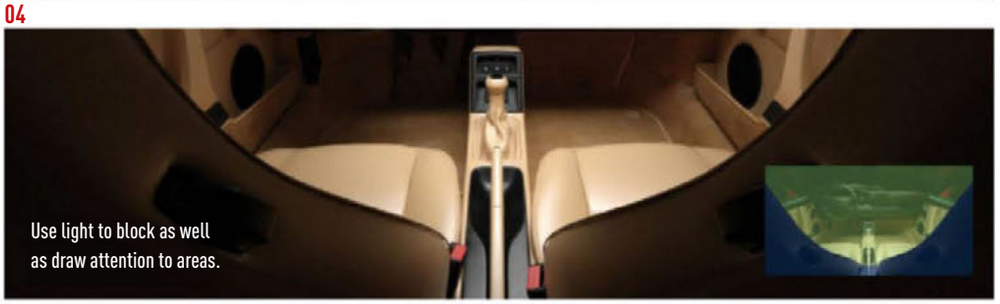


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09a

09b

The success of this image is all about leading the eye and using depth to help guide the viewer's attention.

Try to describe the areas you are lighting as much as possible. It's best to start out of total darkness. You don't have always to be guided by a standard 'hdri', setup but by clumsy usage you will get 'washed' light, which is hard to control. Play with the lights but always have in mind why that particular light is on that particular place.

## 08 CLEAN UP IN COMPOSITING

Compositing is the last phase of an image and allows you to quickly and easily combine many different layers, to influence the contrast, colour, depth of field, motion blur, lens breathing and everything else that's necessary to make your picture look like it was filmed with a movie camera.

It is necessary to be aware that some things are easier left for the compositing stage, rather than wasting your time trying to do it in 3D. For example, in this render we can clearly see reflection of the wheel on the door, which needs to be removed. The plan is to paint out the spotlight on the floor below the wheel, to increase the highlight on the rear tyre and to generally reduce the highlights.

"IT'S REALLY TEMPTING TO GET CARRIED AWAY WITH EFFECTS SUCH AS BOKEH AND GLOW"

Djordje Ilic

## 09 USE EFFECTS TO DIRECT THE VIEWER'S GAZE

It's really tempting to get carried away with shiny light effects such as bokeh and glow, but use them too much and all you do is lose any kind of impact. Restrict these to strong highlights on certain parts of the image, such as metal and glass, in addition to any strong light sources.

Although this image is only a section of the Porsche, attention is drawn towards a diagonal slice in the middle thanks to the glow and bokeh effects. I began by using lines to work out the composition of the image, and then applied the effects following those lines.

## 10 SELECTIVE HIGHLIGHTS

Using photographic techniques, such as a shallow depth of field, is a really useful way of drawing attention to an area, but highlights can also help achieve the same result. The problem with a shallow depth of field is that because all of the detail in focus is right at the front of the image, the viewer can find it difficult to know where to look. In our example here, highlights are used to pick out the texture on the headlight and Porsche logo. Not only does this give a tactile quality to the image, but it helps avoid the image look flat.

## 11 LIGHT MULTIPLE MATERIALS

Play with the angle of the source light to make the most of textures. The lighting in this image is placed to accentuate the textures. If it was placed in a different position, some of this detail would have been lost. When you are aiming for photorealism, it is by emphasising recognisable elements that you will achieve your goal.

## 12 LIGHT A SCENE

Of course, at its most basic, lighting is a way of setting the scene for your image. If you are dealing with a real-world object, think about how lighting might be used in a real-life setting. For example, motor shows will often use dark backgrounds, with a strong spotlight on the car being unveiled. It isn't complicated, but it is a recognisable setup, and will therefore aid in making your image feel believable.

10

11

12

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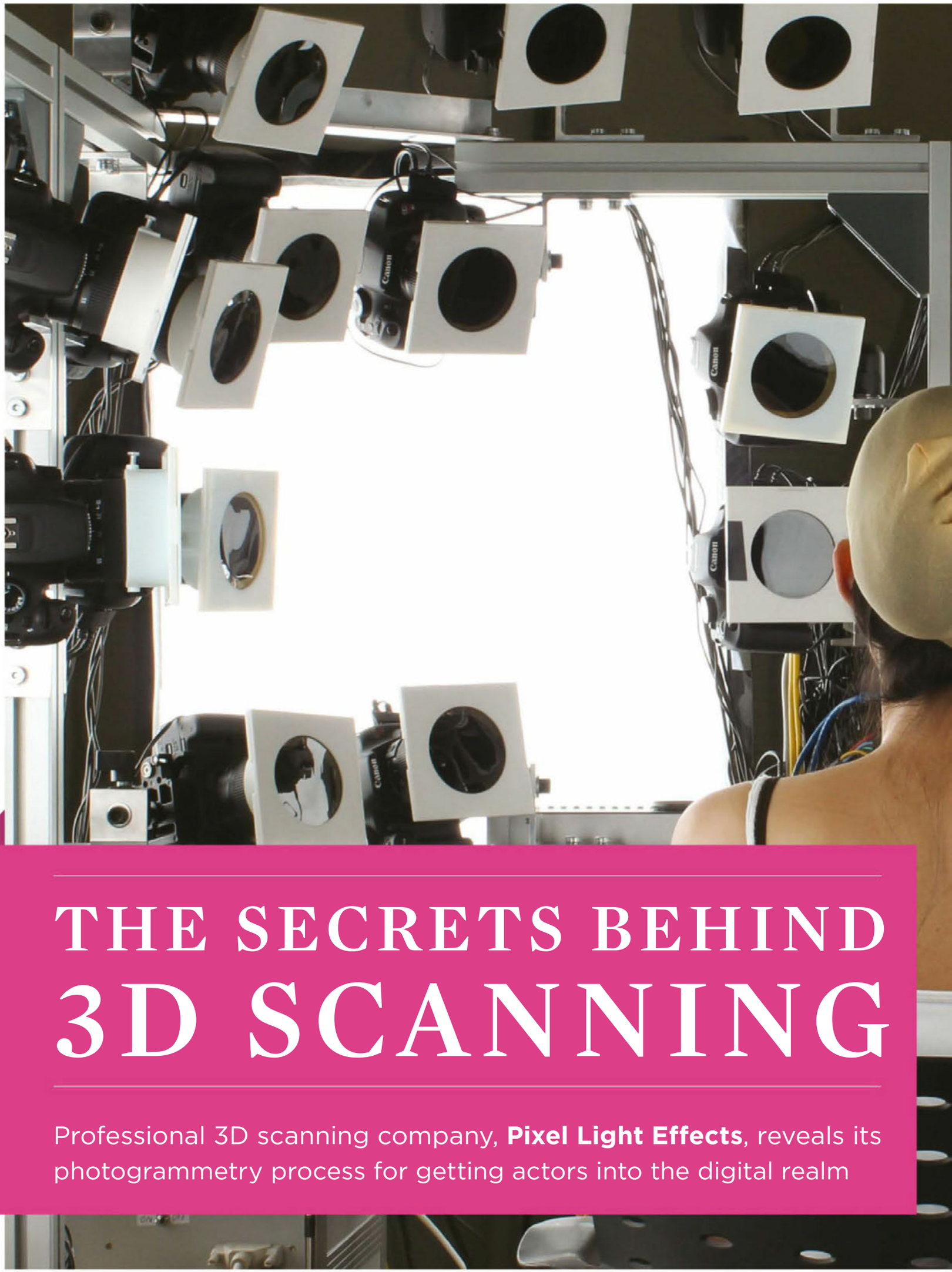
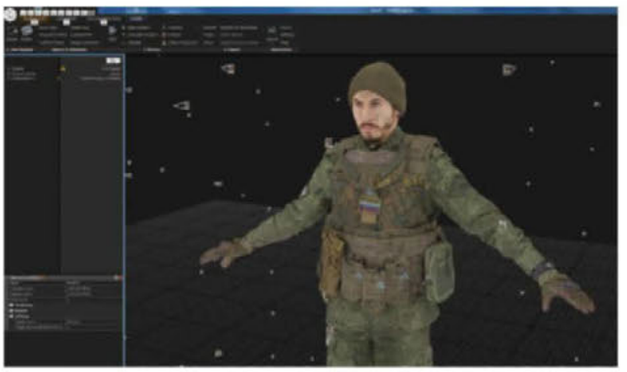


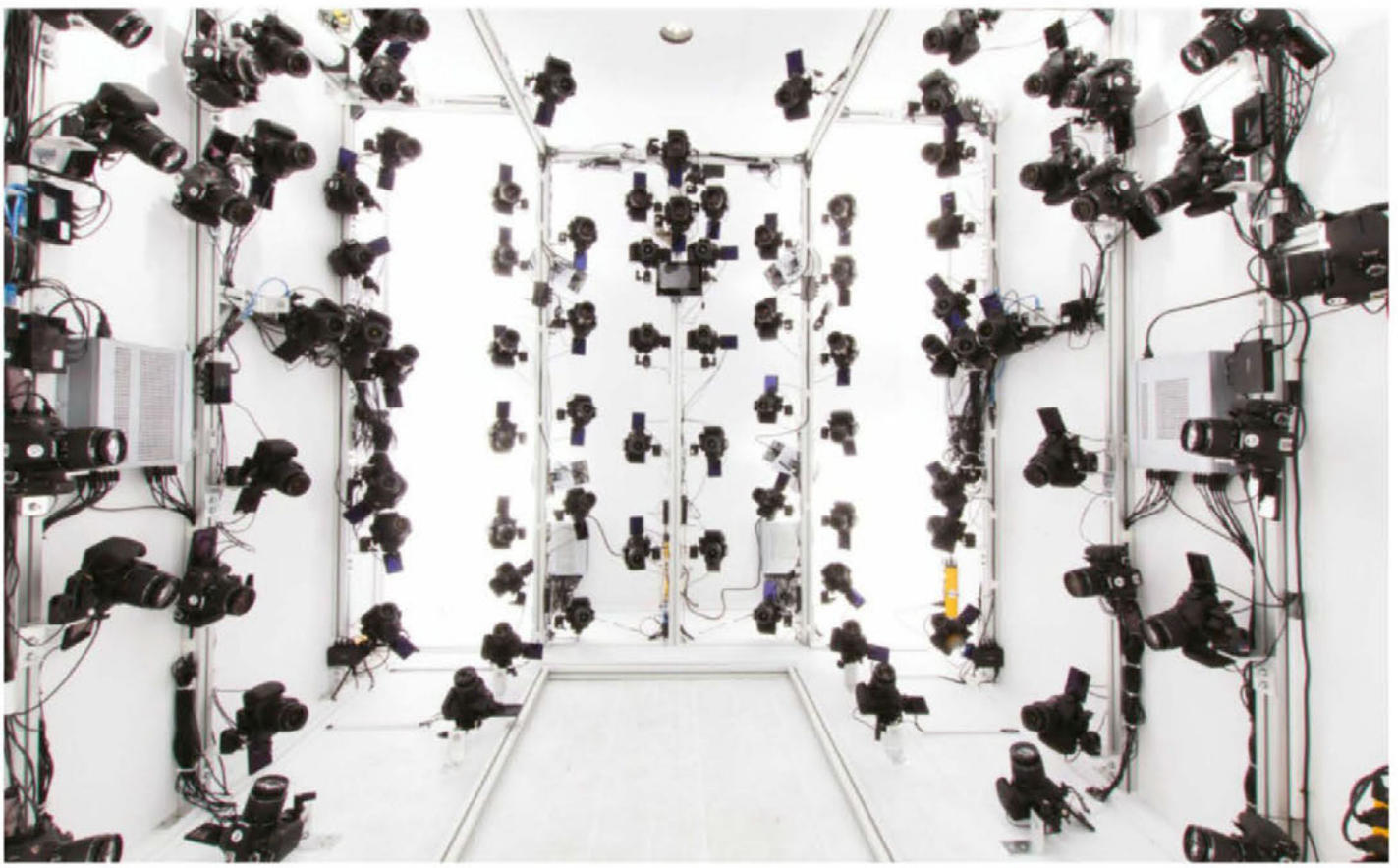
# THE SECRETS BEHIND 3D SCANNING

Professional 3D scanning company, **Pixel Light Effects**, reveals its photogrammetry process for getting actors into the digital realm

The 32-camera rig used for facial scanning and acquiring facial blend shapes also features cross-polarized filters to remove specular highlights.



Pixel Light Effects uses both Agisoft PhotoScan and RealityCapture, seen here, to resolve models from its photogrammetry capture process.



The photogrammetry camera array inside the Pixel Light Effects van is made up of 144 Canon DSLR cameras.

Whenever you see a comic-book hero flying through space or crashing through a wall, chances are they're a digital double of a real actor expertly crafted by a visual effects studio.

But how is an actor's likeness captured with such absolute photorealism? These days that's often the domain of 3D scanning providers, which rely on portable – and often custom – photogrammetry rigs that they can bring right onto the set. That way they can whisk actors in and out of the scanning process and generate a CG model of their face and body as fast as possible, helping save the film studio a lot of expensive production time.

One company in the 3D scanning services fold is Vancouver-based Pixel Light Effects. Using its mobile photogrammetry setup, the studio recently scanned principal actors and extras on location in British Columbia for Matt Reeves' *War for the Planet of the Apes*, creating detailed CG models to give to Weta Digital for the subsequent digital double work.

**3D World** asked Pixel Light Effects, which also has a presence in Beijing, how it tackles a typical actor photogrammetry scan – from the capture process right through to producing a useable high-resolution CG model.

## The basis of a 3D actor scan

Over the years, several methods have been used to accurately capture the essence of an actor in CG. These include laser scans, specialised 'light stage' contraptions, and now most commonly, photogrammetry. This process essentially involves taking hundreds of photographs of the actor from multiple angles. The photos are fed into computer software, which then sets about comparing the images and using them to build a 3D model.

Photogrammetry is considered an efficient method of capture because it is quick, especially in a camera rig that has many cameras at many angles taking all the


Raw photographs of subject Sam Yunussov, posing as a Russian paramilitary member, from one of the 144 cameras taken during the photogrammetry scan.

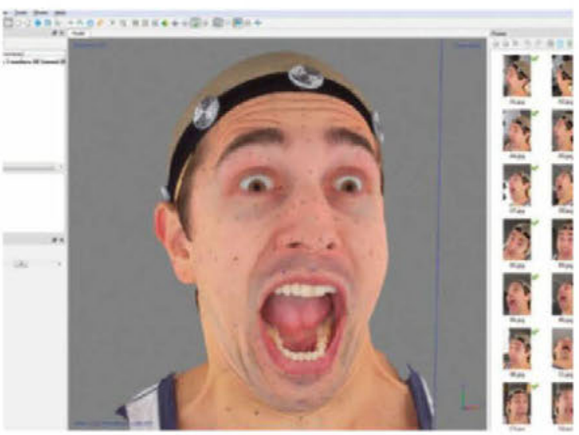
## FACE-TIME

**A SPECIALISED HEAD RIG ENABLES PIXEL LIGHT EFFECTS TO CAPTURE HIGHLY DETAILED SKIN TEXTURES AND FACIAL BLENDSHAPES**

Although Pixel Light Effects' truck-based mobile photogrammetry rig provides photorealistic results, the company also offers another portable 32-camera rig devoted to capturing facial expressions and poses in motion, including FACS poses – intended to result in a facial animation-ready CG model.

The rig also takes advantage of cross-polarised lighting to completely cut specular reflections from the skin. This results in better textures and geometry detail and less surface noise in the photogrammetry process.

"Another benefit with a head rig," adds Pixel Light Effects CEO, Jingyi Zhang, "is that the actor can comfortably sit in it for blendshape sessions. We also have a head stabiliser to minimise skull movements. Depending on the list of requests from a VFX studio, a session can vary from between 30 to 80 facial blendshapes, and take anywhere from 40 minutes to a couple of hours to complete."



The result of a facial scan inside Agisoft PhotoScan. The subject had marker dots placed on his face to help the feature tracking and animation.

## "EVERYONE WHO DOES PHOTOGRAMMETRY KNOWS YOU JUST CAN'T HAVE ENOUGH CAMERAS"

**Jingyi Zhang, CEO, Pixel Light Effects**

pictures at the same time. Indeed, that's what Pixel Light Effects uses, and further mobilises the scan by having it take place in the back of a truck that has the photogrammetry rig permanently installed inside. The truck can be driven directly to the set where the actors are, or just about any other location.

"Mobility is the biggest issue with a rig consisting of hundreds of cameras," says Pixel Light Effects' CEO, Jingyi Zhang. "Taking them apart and putting them back together is very time-consuming and labour intensive. It just doesn't feel right. However, due to the tight schedule of the production, sometimes it's just impossible to have the talent come to us. Being able to perform the service on set is very essential."

### What's in the truck?

Pixel Light Effects' photogrammetry rig, contained in a modified Mercedes-Benz Sprinter van, is made up of 144 Canon DSLR cameras. These are all synchronised using a proprietary 'Camera Hub' device, which supplies power and triggers 16 cameras at once. "It's designed to be daisy-chained together, so we use multiple devices to trigger the larger array," explains Zhang.

Lighting is an essential part of the photogrammetry rig. For this, multiple flashes and bounce light ensure that there is enough depth of field in the resulting images, and that the actor is lit evenly. The van interior is also decked out

in white and the environment is calibrated so that it is as diffuse as is possible.

The camera positions inside the rig were R&D'd by Pixel Light Effects for several months before an optimal layout was reached. "Everyone who does photogrammetry knows you just can't have enough cameras," notes Zhang. "You always want more. Having a constrained budget and space means we must have just enough coverage at every angle."

## "THE CAPTURE IS AS FAST AS TAKING A PHOTO"

**Jingyi Zhang, Pixel Light Effects**

### Inside a scanning session

When an actor comes into the truck for a scan, Pixel Light Effects typically has just two technicians running the scanning session. First they will ask the actor and on-set supervisors if it is okay for the talent to wear a hair net. "This gives a more accurate skull shape, which will be helpful down in the pipeline," explains Zhang. However, it may be crucial for an actor to retain their exact wardrobe, such as a helmet or a faux hairpiece.

For a full-body scan (Pixel Light Effects also carries out detailed facial scans – see FaceTime boxout), the actor will be instructed to make an A-pose, with their elbows and knees slightly bent for rigging purposes. The actor's face is typically posed in a neutral way and then aligned with extra witness cameras.

The actual capture is like taking a photo, again highlighting the benefits of a photogrammetry rig. "The capture itself is as fast as taking a photo at 1/1000th of a second," says Zhang. "All the cameras are synchronised, which means we can scan animals – who of course don't stay still – as long as they fit in the capture volume."

### Scan and deliver

The resulting photographs are simply raw images, but they are

# HOW TO SCAN SOMEONE IN LESS THAN 5 MINUTES

Don't have access to a photogrammetry camera array? No problem, these tips and tricks will show you how to capture an actor quickly with great results

01

Johnathan R Banta (right) captures the subject, R Brent Adams, using quick-fire photogrammetry.

Imagine you're on location with little equipment and only a few minutes with your actor. Getting an accurate scan and generating a useable CG model is now possible with just a smartphone and a laptop running Agisoft PhotoScan software.

LA-based Emmy and VES Award-winning visual effects artist, Johnathan R Banta, from Agrapha Productions (**http://agraphafx.com**), breaks down his five-step 'RapidCapture' photogrammetry process, taking advantage of professional tools.

**STEP 1. GET THE ACTOR READY**

Have your actor sit or stand (either is fine as long as they remain stable) and fix their gaze on a point in the near distance.

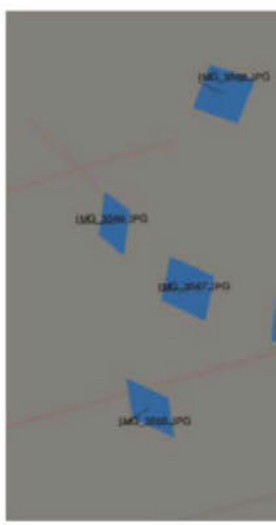
Try to avoid direct sunlight or hard shadows. Our example here was in a room with fluorescent tube lights, but any ambient illumination is fine.

Clothing does not matter too much, but try to avoid solid colours, especially white, as the photogrammetry software finds this harder to solve (in our example, the subject did in fact have a white shirt on).

**STEP 2. CAPTURE YOUR ACTOR**

Use any camera app on your smartphone (or use any camera). Try an app that lets you fix exposure for better results.

In this example, we captured a 'hockey mask' portion of the actor's face with just 15 photographs following a geodesic capture pattern at a consistent distance from the actor. Starting at a 45-degree angle to your subject, take a total of 15 photographs in a 'plus-cross-plus' configuration.



03

Take one photo in the centre of the angle, stretch arms up, down, left, and right while taking photos pointing at the subject (ie, a plus pattern).

Cross-step 45 degrees around to the front, and photograph in a cross pattern. Take one photo in the centre of the angle, stretch arms to the upper left, upper right, lower left, and lower right while taking additional photos pointing at the subject.

Step 45 degrees around again, and then repeat the plus pattern. You can always take more photos – a full rotation around the subject is likely to be 48-50 photos – but remember that the idea here is to carry out this scan as quickly as possible.

## STEP 3. SOLVING THE SCAN

Import your photos into PhotoScan. Choose one photo as the representative angle before picking the Align Photos option. This produces better results, and sometimes will determine the success of the algorithm.

There are several options in the software for resolution and point correspondence. The most consistently successful setting at this point has been to use the MEDIUM solving resolution, and leave everything else at default.

If you are pleased with the alignment, go on to the build dense cloud step, which will use your solved cameras, and sparse point cloud as a guide for a more involved algorithm. There are several resolution options, but to test the solve, a resolution setting of MEDIUM can produce results good enough to evaluate with.

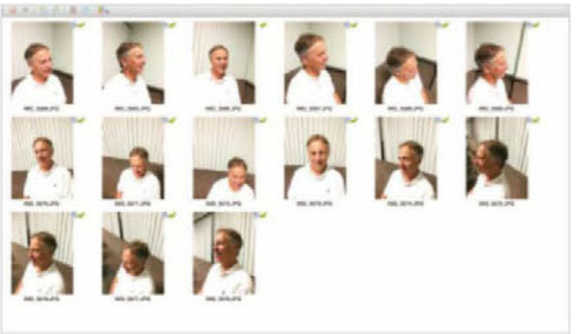
There is often extra material in the dense point cloud that is not your subject. Use the lasso tools and other selection methods to delete this excess data before going any further.

## 4. MESH AND TEXTURE MODEL

PhotoScan can take the resulting point cloud, and build a mesh of polygons to re-create the surface. Depending on your photos and detail of the subject matter, results can vary. Again, it loves detail, so areas of flat, smooth colour may end up a little noisy (most actors wear make-up to smooth out their skin, and this can result in a noisy solve).

The open-source software MeshLab has many capable tools that can take your exported points and build a surface, and if you need to work quickly, it can sometimes do this faster than PhotoScan. If you are serious about this, it is worth a try, but PhotoScan can do a very reasonable job of it, too.

The resulting mesh can be exported to other software as a guide for clean-up and modelling. As long as you keep the original scaling and orientation exported from PhotoScan, you can re-import this model for texturing. This is not necessary for quick evaluation, though, and you can build textures directly on the solved mesh as well.



02

The resulting 15 photos from the capture session.

The final step is to build texture on the object by projecting every single solved camera image onto the 3D model, and average the result inside PhotoScan. With properly aligned geometry, it is possible to achieve credible results quickly.

## STEP 5. NOW WHAT?

Export your model to a 3D program for whatever you need. Export formats include FBX, OBJ, PLY and more, which means you can work with the model in tools such as Maya, ZBrush, Mudbox and 3ds Max.

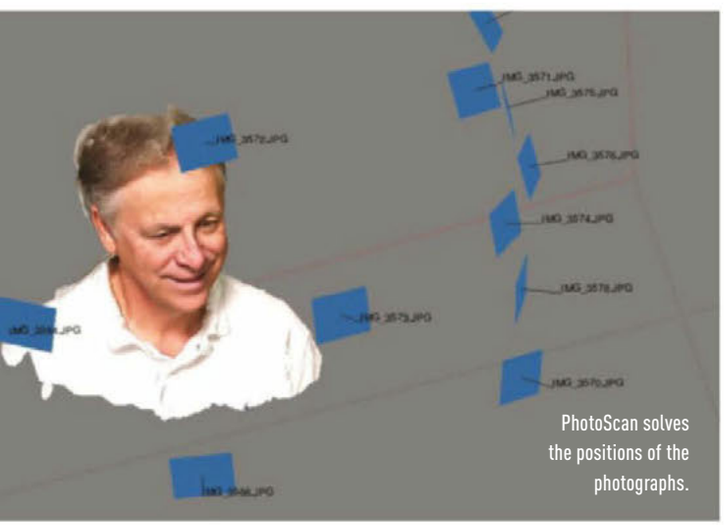
It's in one of these tools that you can also do further clean-up, or take advantage of the dimensionally accurate model to aid in tracking, matchmoving or digital make-up work.

Remember you have the original photos for reference.

The resulting model. It will still need cleaning up, but clearly resembles the actor.

Thanks to R Brent Adams, Director of the Center for Animation at Brigham Young University, for volunteering to be our scanning subject.

The original photographs will be used to add textures on the CG model of the actor.



PhotoScan solves the positions of the photographs.

04 & 05

The textured head of the scanning subject.

managed by Pixel Light Effects and ingested into photogrammetry software, typically Agisoft PhotoScan or RealityCapture. It is in here that a CG model is produced, essentially via the push of one button. However, the company does also perform clean-up of the resulting model in ZBrush and Maya to generate a shaded or textured form. This tends to involve patching any holes of missed details and removing surface noise.

Pixel Light Effects will provide a client, such as a visual effects studio or the film production, with an OBJ model, JPG textures, FBX files, the raw images, a colour chart for grading, and the PhotoScan or RealityCapture project file for re-projecting textures (since photogrammetry is photography-based, the scans 'automatically' come with high-resolution textures, and these can help create additional fine detail).

Although the company is relatively new to 3D scanning, it is already busy on productions in both Canada and China. One recent addition to Pixel Light Effects' truck came from a suggestion they received after demonstrating the vehicle to members of the Vancouver visual effects community.

"Improvements were made [as a result of] a 'roadshow' we had," remembers Zhang, "where we added live view cameras and monitors, so that the VFX supervisor could communicate with the talent from back of the truck, while the talent was being scanned."

For as long as an audience demands films that defy reality, you can rest assured that somewhere there will be a truck full of cameras, busy scanning an actor's features to transform them into something incredible.

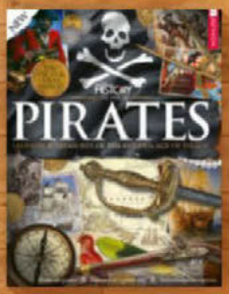
## "WE ADDED LIVE VIEW CAMERAS SO THE VFX SUPERVISOR COULD COMMUNICATE WITH THE TALENT"

**Jingyi Zhang, CEO, Pixel Light Effects**

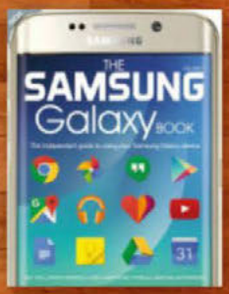
**FYI** *Learn about Pixel Light Effects*
**www.pixellighteffects.com**


Pixel Light Effects' mobile 3D scanning van is a modified Mercedes-Benz Sprinter.

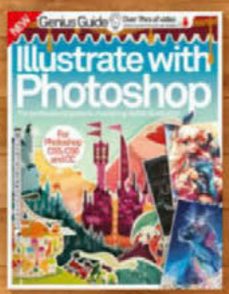




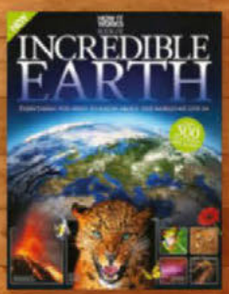














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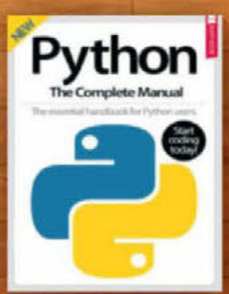


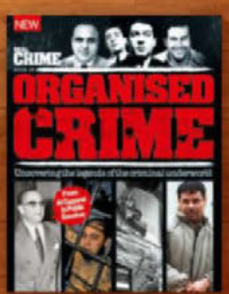








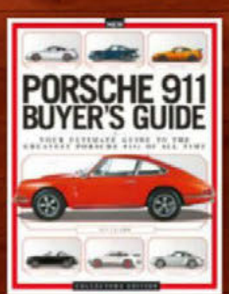


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# THE MAKING OF *MAMOON*

**Paul Champion** talks to Tom Box and Ben Steer from Blue Zoo about their latest short film, *Mamoon*

Ever wondered what happens when you mix Maya character animation, projectors, hand-held cameras and lots of polystyrene blocks? London-based multi BAFTA award-winning animation studio, Blue Zoo did, and then found out! Its short, *Mamoon*, is the latest offering from the studio's in-house animated short film programme that was established in 2012, designed to push the studio into new creative directions, while nurturing both the in-house talent and a creative culture in the studio. "Generally, agencies request work that features heavily in our showreel" explains Tom Box, co-founder/managing director. "So the short film programme helps us to push the studio forward, experimenting with new technologies and styles without commercial pressures. Over the past five years, the programme has been a great success with short films gaining worldwide recognition and bringing a wider range of work into the studio." With previous shorts tending to be more humorous, from singing naked elves to germs voiced by Adam Buxton – one half of the comedy duo Adam and Joe – the goal for Blue Zoo was to push itself in a new direction entirely.

In February 2016, Blue Zoo put out an open brief to all employees inviting them to put forward a treatment for any ideas they might have. The brief was fairly simple – create an emotional, human story with the proviso that the characters be animated in Maya, but then projected and filmed. "The idea behind this," Tom reveals, "was to benefit from the beautiful optical properties created in the process, elements we usually spend a lot of time and money trying to recreate – refractions, reflections, light bounce and depth of field. The only thing that would be done in post-production would be grading; everything else would be captured in camera." After the brief was set, everyone had a few weeks to put a pitch together before presenting it at a studio-wide ›

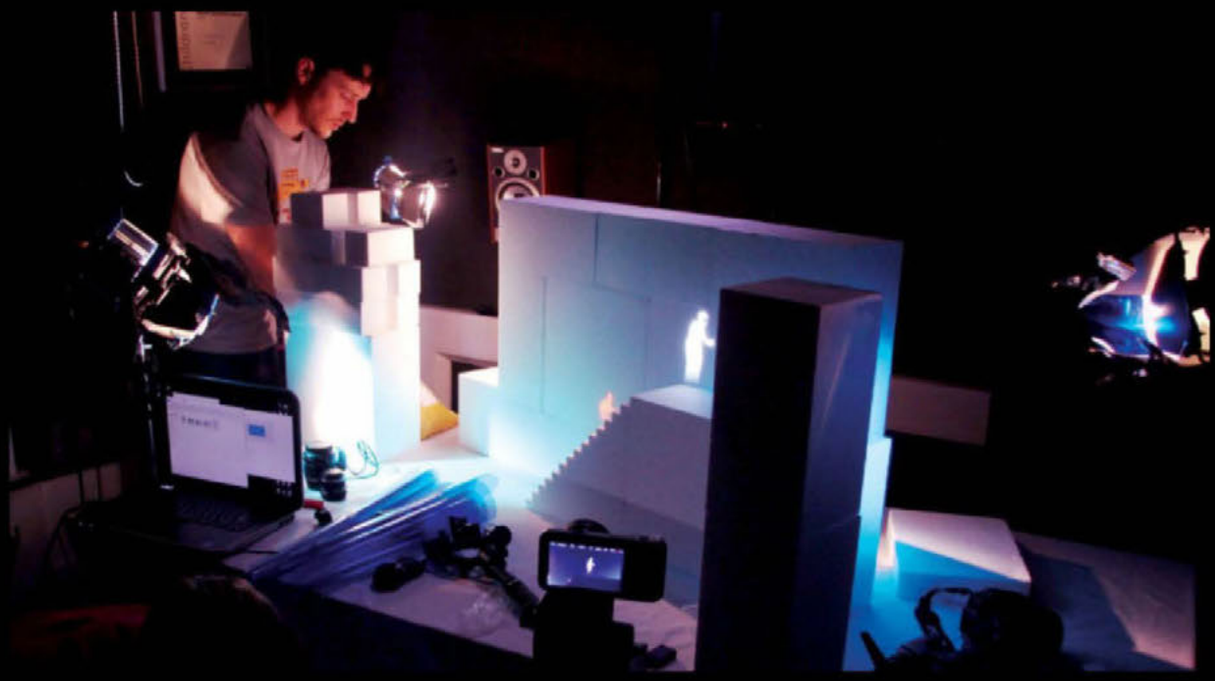
"THE SHORT FILM PROGRAMME HELPS US TO PUSH THE STUDIO FORWARD, EXPERIMENTING WITH TECHNOLOGIES AND STYLES WITHOUT COMMERCIAL PRESSURES"

**Tom Box, founder/managing director, Blue Zoo**

Light scatter and bounce off the polystyrene surfaces gave texture to the environment.

The short made use of light physics that you get for free, such as reflections and refractions.

A blacked-out spare edit suite was converted into a makeshift film set for 8 weeks.



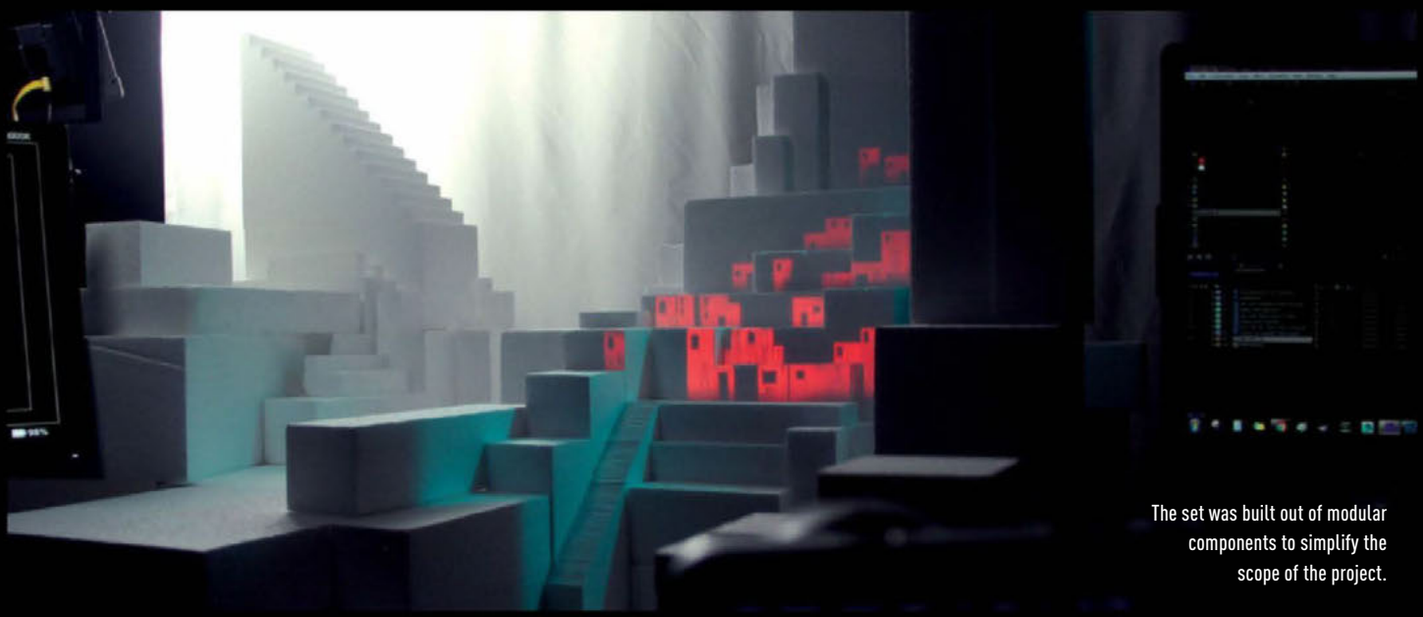
"I CAME UP WITH THE IDEA OF BUILDING MINIATURE BESPOKE SETS"

**Ben Steer, animation director, Blue Zoo**

presentation. Everyone was then invited to anonymously vote for their favourite, with the idea receiving the most votes going into production. The winning idea came from animation director, Ben Steer. "At the time, there was a lot of press coverage of the Syrian refugee crisis," Ben explains. "I saw the brief as the perfect reason to get creative with something I felt passionate about. I found the brief really intriguing and felt strongly that light should represent life, just as lack of light should represent death. If a character is dependent on light, then shadows, objects and glass could hinder and distort them. Projectors also only project from one angle, what if multiple projectors were used for multiple characters? This presented a fascinating, if challenging, set of parameters in which to devise a story."

## THE PRE-PRODUCTION STAGE

As part of the pitch, Ben conveyed his ideas by creating a rough storyboard, so the first step was to refine it. At this stage, the idea involved two projected characters moving along the walls of a warehouse or old building, with the walls themselves dictating the canvas and the landscape through which the characters had to travel. "We soon realised that filming on location would be extremely challenging due to logistics and time", says Ben, "so I came up with the idea of building miniature bespoke sets." Inspired by theatre design from the early 20th century, and most notably by the work of Adolphe Appia, Ben came up with a simplistic, modular design that could be reused for multiple shots.



The set was built out of modular components to simplify the scope of the project.

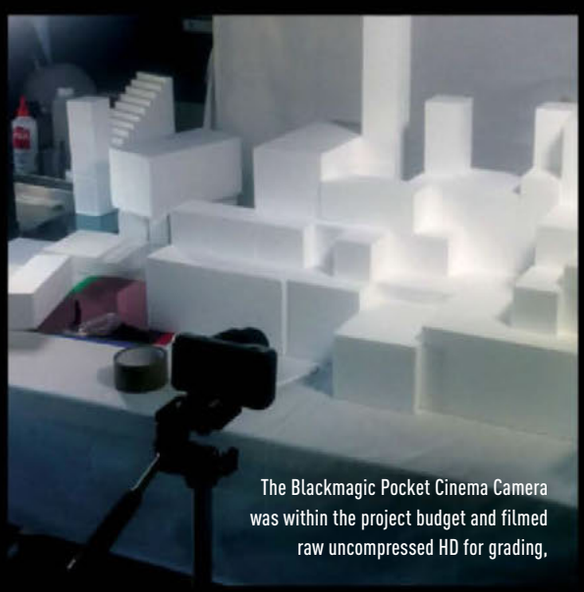
"At first, wooden blocks painted grey and white were used to project onto but the footage looked surprisingly computer generated and lacked the tactile and hand-crafted feel we were after," says Ben. "We knew that if light was to feature so heavily throughout the piece, the surfaces needed to react to the characters being projected onto them. The answer came in the form of polystyrene. The many microscopic pores in the surface meant that the light bled into the surface, giving the impression that light was somehow generated from within, as opposed to without. It proved to be the perfect material: light, cheap and very easy to manipulate with the help of a hot-wire cutting tool. So after ordering a lot of polystyrene, we blacked out one of the spare edit suites and set up a temporary film set."

During pre-production research, Ben was constantly refining the animatic. In order to ensure the shots would actually work in physical space, he made mock-ups of the sets in Maya using virtual cameras and simple cuboids, before sketching on the characters in Photoshop. "This way, Ben could present the ideas to others for feedback while giving them a good impression of what the resulting footage might look like," Tom adds. The characters

## LIGHTS, CAMERA, ACTION

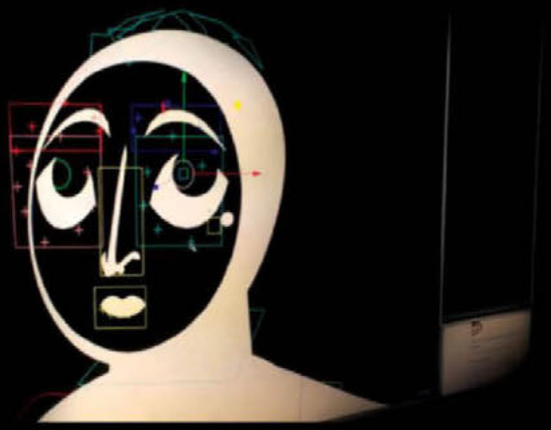
FILMING *MAMOON* GAVE THE CREW A NEW SET OF CHALLENGES TO OVERCOME

The team used a Blackmagic Pocket Cinema Camera, which captured raw, uncompressed HD footage they could heavily grade without artefacts. "We had a few problems with the projector and a flickering that was only evident once footage was reviewed on a monitor," says Tom. "We tried all adjustments from camera shutter angles to projector refresh rates but nothing would eliminate it." The team opted for a projector that used a different technology, which fixed the issue immediately. "From then on it was full speed ahead... for how long we didn't know," remembers Tom. "There were 40 shots of varying complexity and each one could take an hour or a day, so we blocked out a few weeks for filming. It was at this point we were relieved we'd opted to use our own studio – hiring somewhere for that amount of time would have bankrupted us!"



The Blackmagic Pocket Cinema Camera was within the project budget and filmed raw uncompressed HD for grading,

Marylou Mao designed the characters, aiming for an illustrative simplicity while animatable in CG.



The character's faces are created using lofted curves to give maximum control to their shape.

## "ANIMATING WITHOUT DEPTH ALLOWED US TO SHAPE AND BREAK THE MODEL"

**Ben Steer, animation director, Blue Zoon**

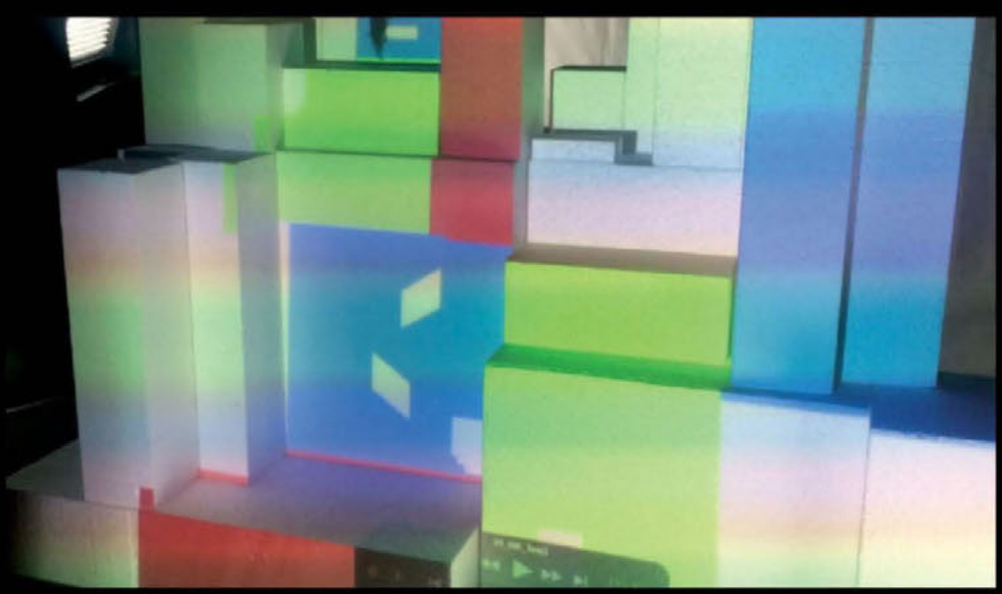
› were designed to be 2.5D, so were fully 3D but designed only to be rendered flat shaded mostly in silhouettes. The cast of animated characters, consisting of a mother, baby and child, were modelled and rigged in Maya.

### INTO PRODUCTION

Due to the unique nature of the production, the animation process required a different approach to the studio's usual methods. "Animating without depth allowed us to shape and break the model in order to create better silhouettes," Ben recalls. "Normally on a production we animate to the exact length of a shot and, when the shot is finished, the animation ends.

On numerous shots in *Mamoon*, an entire animated sequence would play out in real-time before being filmed from multiple angles, affording us greater freedom in the final edit. For each shot, the set would be physically built in its rough form then photographed from the intended camera angles for reference. Animation would then be done using this photo as a backdrop in Maya for character blocking and placement. Once animation was complete, the set would be rebuilt and the important elements of the set would be mapped out using a projector and Photoshop. The resulting Photoshop image would then be put into After Effects and layered up with the animation, which was then aligned to the set elements, to create the finished projected sequence. The process would often involve going back and forth, tweaking elements of the set and animation, which was quite time consuming. We tried out various projection mapping software but this process gave us the control we needed and fitted into our usual workflow process. As always, the simplest process works out to be the best!"

The process involved recreating the set in CG then re-projecting the elements back.



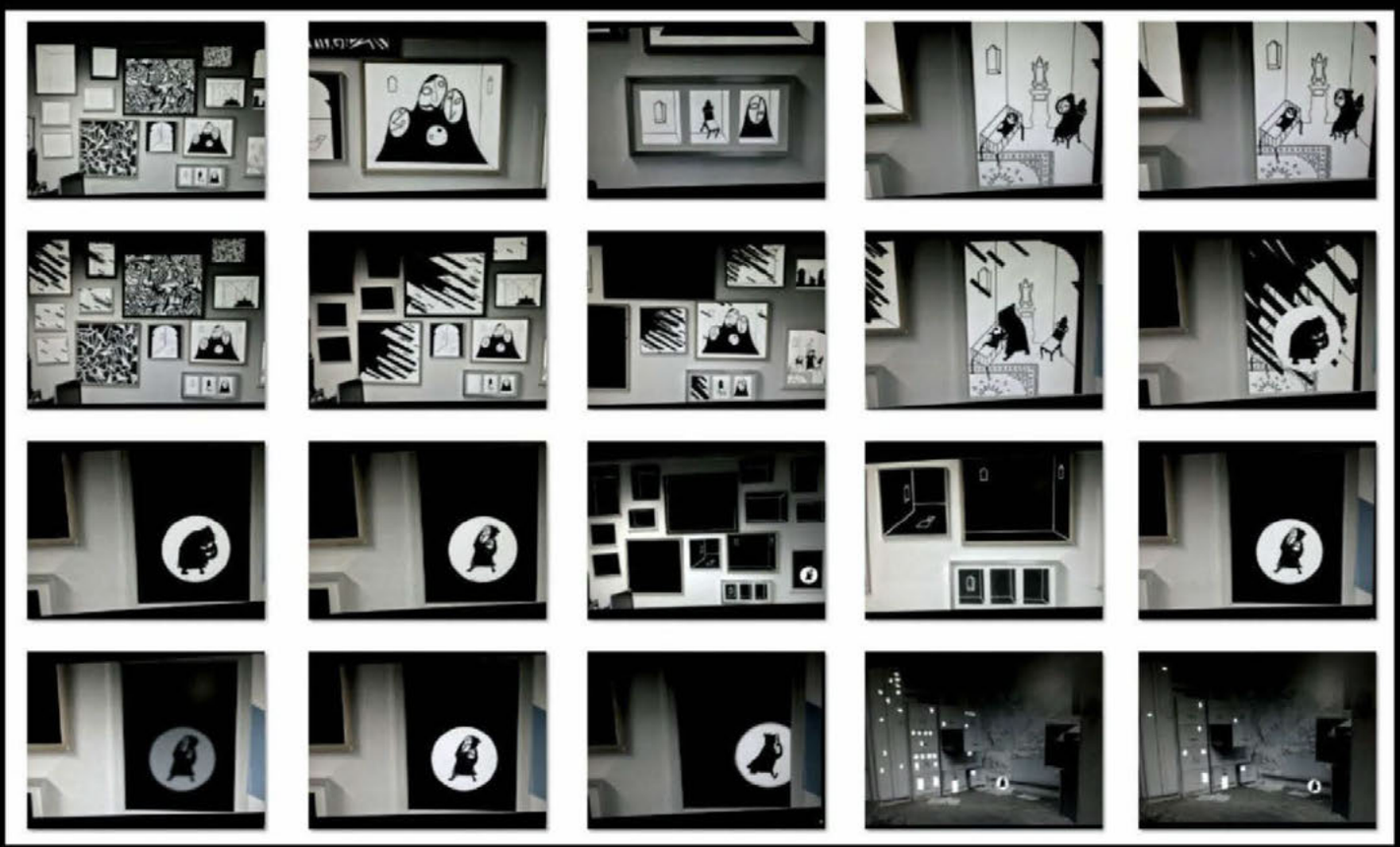
To light the set, the same techniques were employed as would be found on stop-motion sets – a combination of small, dimmable dedo lights with barn doors and black wrap with tinted gels for smaller pools of coloured light, and LED panel lights for larger, ambient sources of light. "As the project progressed," Ben explains, "we realised that projecting pools of light with the projector itself was very effective and afforded us more control while retaining the same look as traditional lighting techniques. This meant that we could paint pools of light or shade where they were required in After Effects. For the camera we wanted a handheld feel to give it slightly organic, documentary-style cinematography, so it felt like you were observing a spontaneous story unfolding, not a pre-calculated animation." A range of different options were tried and

## CONVEYING THE STORY

IN ANIMATION, IT'S ESSENTIAL THAT THE STORY WORKS AT ANIMATIC STAGE

"We had many iterations of animatic to make sure the short worked, both in narrative and at an emotional level," Tom explains. "It's very tempting to crack on with animation and have the 'we'll fix it later' approach, but this almost always ends in disappointment. At Blue Zoo we always try and make sure we're 100% happy with the animatic before we move onto the animation stage." In *Mamoon* this was even more important, as there was limited time to film, and no time to go back and tweak shots after filming.

"The short was initially set around various locations, including our studio and a warehouse, but we soon realised that we needed to film in-house as we needed to access the location for a few weeks of filming due to the complexity of the projection process."



An original storyboard used for *Mamoon* during the pre-production stage.

tested from purely handheld, to using gyro-self-levelling handheld tripods, to floor mounted tripods. "The solution for each shot was always a combination of techniques depending on the type of shot and the motion of the camera and the characters," Ben recalls. "But traditional handheld techniques proved to be unusable due to the small scale of the sets, which amplified even the smallest of camera movements to unbearable levels!" At the same time as filming, the animatic was sent to composer Matthew Wilcock at Zelig. "Inspired by Steve Reich, we gave him the brief of a minimalist piece of music in which layers build up into a looping orchestral mix of choirs and strings," Ben reveals. "The idea being that the modular, looping nature of the music could help reflect the modular nature of the set."

Every animated project is only as good as the pipeline that supports it, in terms of technical and logistical. At Blue Zoo there are different levels of pipeline, from full publishing and task version control to more relaxed, simpler processes. "As every project is a different size, doing a very experimental project with a very prescriptive pipeline could have throttled creativity," says Tom. "Whereas for bigger projects we might use ftrack for everything, for this project we used our pipeline publishing tools for the assets, but opted for a more organic approach by using Google Docs to keep track of shot status. For us it's a case of using the right tool for the job, rather than forcing a 'one size fits all' approach."

After filming, the shots were graded in Nuke and the plan was to release it online, but after feedback at private screenings, the feeling was that *Mamoon* was better suited to a big screen as opposed to a mobile phone. For that reason, Blue Zoo has decided to show it at selected festivals, giving people the chance to view it on the big screen before it's released on the internet. If you are at an animation festival over the next 12 months, keep an eye out for it! The teaser trailer is on Vimeo here: **https://vimeo.com/219699171**

FYI

# TUTORIALS

Practical tips and tutorials from pro artists to improve your CG skills

CINEMA 4D STUDIO | VISUALIZE

# CREATE CARTOON CEL SHADING IN CINEMA 4D

**EJ Hassenfratz** demonstrates how to turn your 3D models into cartoonish 2D illustrations

AUTHOR

**EJ Hassenfratz**
EJ Hassenfratz is an Emmy Award-winning freelance 3D designer and tutorial artist based out of Denver, Colorado. Over his career he has worked with numerous big-name brands including Apple, Microsoft, and Comcast. He also runs a company dedicated to helping people master Cinema 4D.
www.eyedesyn.com

Cinema 4D is one of my favorite applications because of its ease of use, and it enables me to tackle any sort of project in any type of style and keep up with the latest design trends with its vast array of tools.

With the advent of mobile games and indie video games, I've seen a big influx of illustrators and animators getting into 3D, mainly through applications like Unity to create 3D games. This has created a trend of cel shaded objects in 3D space, bringing a whole new aesthetic, depth and dimension to 2D-style art.

Thanks to this trend, a feature in Cinema 4D that has existed for years is now seeing a resurgence. Utilising Cinema 4D's powerful, and previously underappreciated, Sketch and Toon module, you can transform your 3D artwork into an illustration with just a few clicks of a button. The flexibility of the Sketch and Toon module lets you experiment with different 2D cel shading styles and have it react to lights in your scene. The flexibility that building your designs or characters in 3D affords is massive. Think of all the complex expressions and rigs you may have seen used to create just simple parallax to rotate or turn the face of a 2D character. You can toss all the complex rigs away and simply rotate the object in 3D and save yourself loads of time! Simple things like this makes Cinema 4D so powerful not only for the 3D artist, but the 2D illustrator/animator as well.

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**CEL SHADING IN CINEMA 4D**
**Enjoy the best of both worlds – the ease of working in 3D space with the illustrative look of 2D.**

## 01 ADD CEL SHADER

Begin by creating a new material to create the cartoon texture. Turn off both the Color and Reflectance channels. We'll be using the Luminance channel because we don't want any type of diffuse shading. We're looking for nice flat shading for our model. Navigate to loading the cel shader into the Luminance channel.

## 02 CHOOSE YOUR CEL SHADING COLOURS

The cel shader works by using a gradient to apply materials across the surface of your object. The more you move a colour's gradient knot to the right, the more of that colour will be represented on your model. You can add or remove colour chips to get the colour combination you like, whether tritone, duotone, or any other combination.

### Accurate preview

By turning on Render>Interactive Render Region, you can more accurately see how the cel shading is applied to your model in the viewport.

## 03 CREATE A LIGHT

Let's create an Infinite Light with Hard Shadows enabled for a cartoonish directional light and sharp shadows. Infinite Lights act like a massive light source, for example, the sun. To change the direction that the light is being cast, all you have to do is simply rotate the Infinite Light.

## 04 USE LIGHTS TO DRIVE CEL SHADING

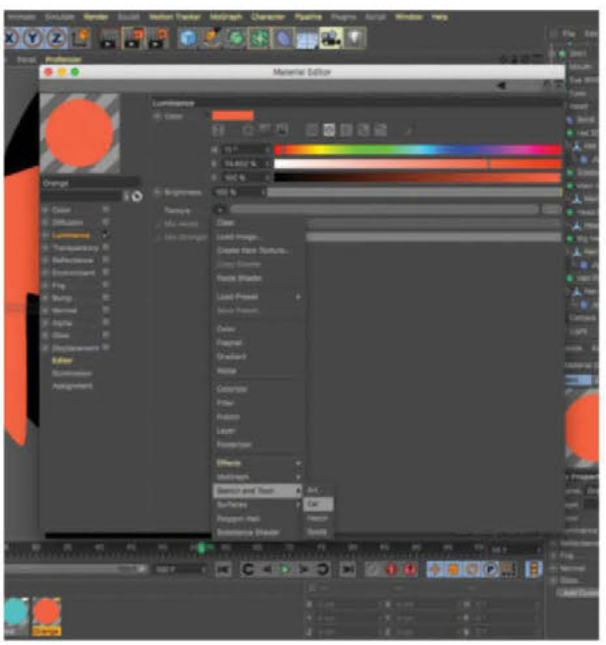
By default, the cel shader uses the camera or your default view as the point of the light source (Camera box checked on). To be able to use a light in your scene as the cel shader light source and to accept shadows, you just need to uncheck Camera and check on Lights as well as Shadows. Now you have total control over how the light is driving the cel shading across your object.

## 05 EXPERIMENT WITH GRADIENT INTERPOLATION

By utilising the different types of gradient interpolation by clicking on the arrow next to Diffuse, it becomes possible for you to adjust how each colour blends into another one, and also discover some interesting stylised diffuse shading beyond just using no smoothing between each colour. For example, try adding contrast by spacing some knots closer together than others!

## 06 ADD STYLISED GRAIN

You can further stylise the look of your cel shading by utilising the Use Bump feature to add some grain. First of all, you must activate the Bump channel and load up a noise shader. Smaller noises work best for fine grain.



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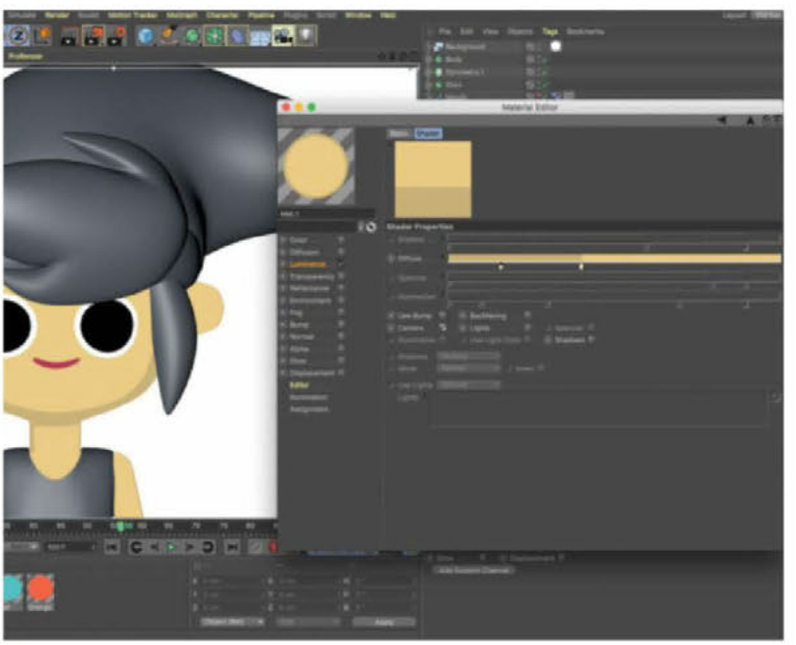

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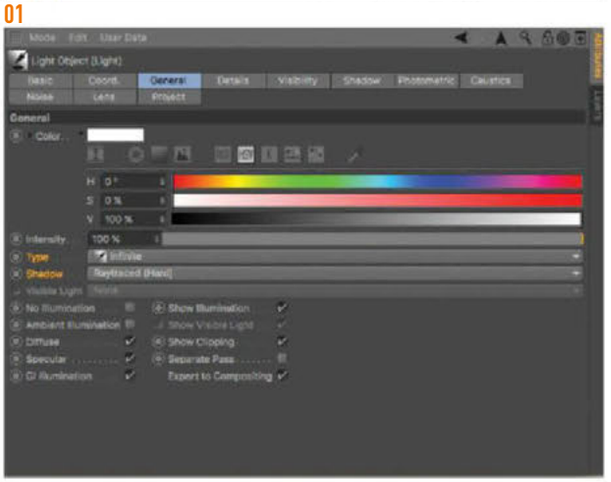

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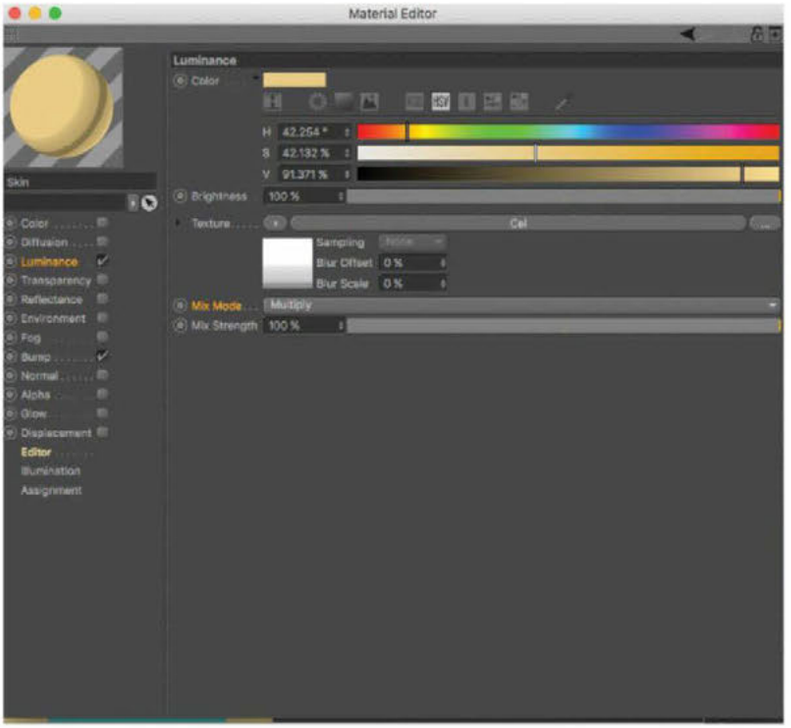



### Essence of design

By just using the Luminance channel without the Color or Reflectance channel, you can remove all 3D diffuse shading and turn your 3D model into flat 2D shapes.

### Colour control

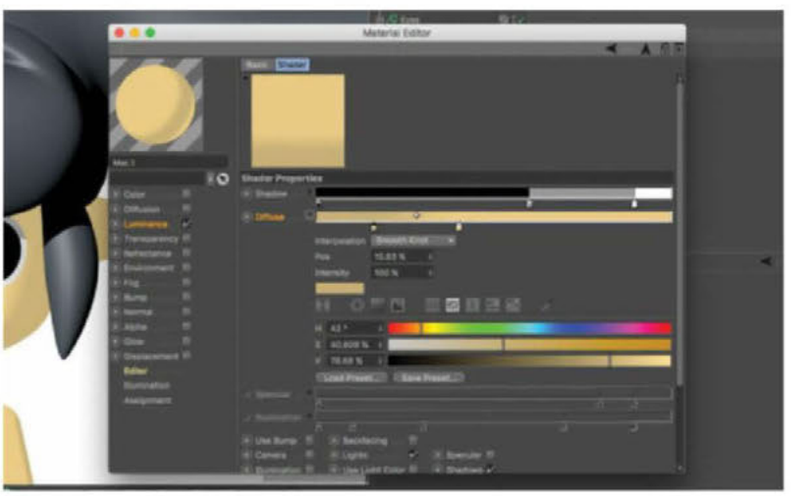
Create greyscale cel shader gradients and change the Cel Shader Texture Mix Mode to Multiply to quickly and easily create multiple colours that utilise the same cel shading.

## 07 USE BUMP

For the Bump channel to act upon the cel shader, click the Use Bump checkbox. You'll see the Bump channel breaking up the cel shader and adding stylised grain to your material. Experiment with the Bump strength in the Bump channel as well as different noise types.

## 08 RENDER SETTINGS

When rendering out cartoon shaded objects, it's important to maintain a sharp, vector-like quality to renders, especially if you plan to composite the image in After Effects with vector layers. Typically you would render out using the Gauss (Animation) filter because it prevents flickering for some animation, but it also blurs your image. To maintain image sharpness, choose filters like Cubic (Still Image) or Sinc.

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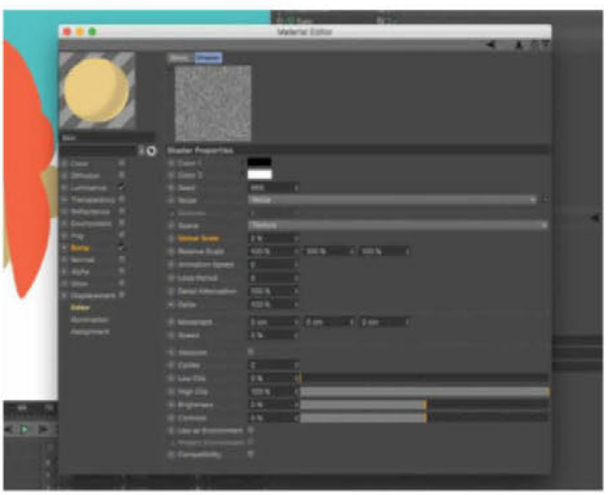


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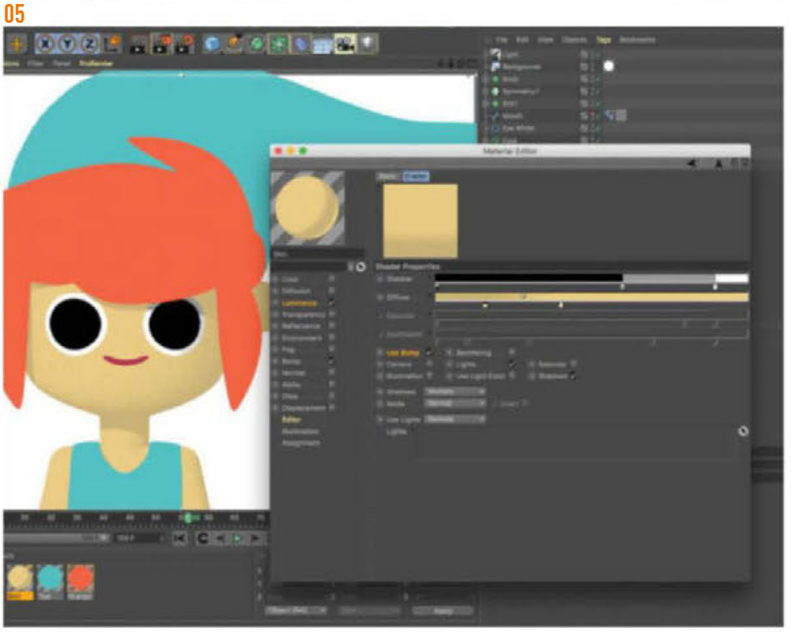


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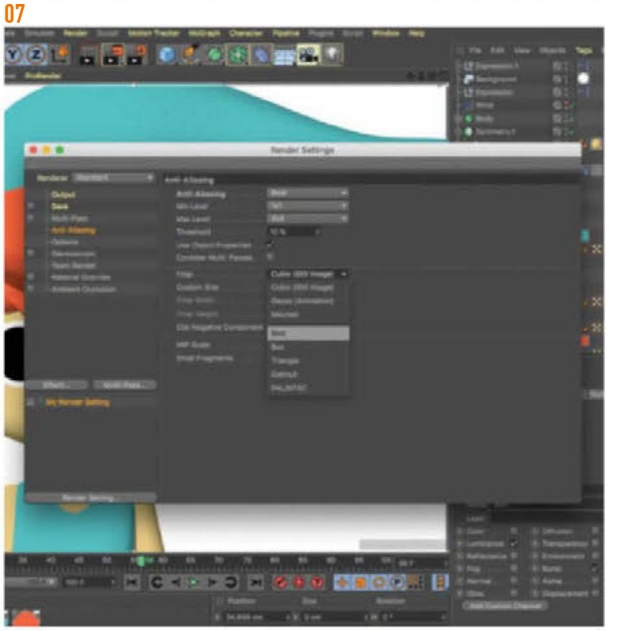


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ZBRUSH | 3DS MAX | V-RAY | ORNATRIX | MULTISCATTER

# DESIGN A CHARACTER FROM SCRATCH

**Pedro Conti** shares his secrets for bringing characters to life

AUTHOR

**Pedro Conti**

Born and raised in São Paulo, Pedro has held various roles throughout his nine-year career, most recently completing a role at Walt Disney Animation Studios working on *Moana*. He is currently working as a freelance 3D artist.
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The fashion and style of the 1980s is something I've always enjoyed and actually inspired me to start creating things. After watching a movie called *Dope*, I got super-excited to create this character. I didn't have a specific idea in mind, but I knew I wanted to make a skater boy. I searched for a bunch of references to help me with the outfit, skateboard and location. The boombox is something I could not resist. One of the challenges of the project was the fact I decided to design the character myself, something I don't usually do commercially, so working on the design, layout and pose was the most timing-consuming process for me. It ended up being a fun project and I learned a lot while working on it.

Cory Loftis is an artist that inspires me a lot, and I tried to emulate the kind of composition and shapes he uses in his work. In addition to the actual shapes, I also played with the contrast between straight and curved edges, as well as tapered shapes. The composition is pretty flat so I decided to create a diagonal that brings a dynamic feel to the image and also helps direct the attention to the character's face. This project took around a month to produce in my free time.

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**EIGHTIES SKATER BOY**

Creating a character from scratch can be tricky, so have a clear idea and style in mind, then fill in the blanks.

## 01 FIND THE CHARACTER

I started in ZBrush. Using DynaMesh I played with the shapes, trying to figure out the personality and design. At the beginning I didn't care too much about details; the main thing was to find the essence of the character. I tried three different designs until I found one I was happy with. With the shapes sorted, I started preparing the character for production.

## 02 TOPOLOGY

To get a clean mesh for rendering, I used ZRemesher in ZBrush. Using the keepGroups function in ZRemesher, I was able to create the main loops I wanted on my mesh. ZRemesher gave me a good base to bring to 3ds Max for some additional poly modelling work on the clothing and props. The body was made totally in ZRemersher I and didn't put any extra work on it since it was only for an illustration.

## 03 UVS

To create the UVs, I used 3ds Max for the seams and brought it back to ZBrush to relax the mesh with the UVMaster plug-in. That's a pretty easy and efficient pipeline that I use in all kinds of projects. After that, I brought the mesh back to 3ds Max for organising the UV layout in the best way.

## 04 POSING THE CHARACTER

To pose the character, I used Transpose Master inside ZBrush. This is the trickiest part of creating a character. I took a few pictures of myself to help me work out the details of the pose. While posing the character in 3D, I was taking screenshots and tried to draw over my model, so I could get a nice flow and gesture in the pose. I've been trying to learn 2D art techniques and that is helping me a lot with my 3D skills.

### Don't be afraid

In 3D art, it is very easy to focus on the details and forget about things that will make a difference in your final image. I would suggest experimenting with shapes and colour, and try to use Photoshop as a tool to help you push things to the next level. The Liquify Tool is something I use all the time to shape objects, then I move back into 3D and update those fixes in my final model.

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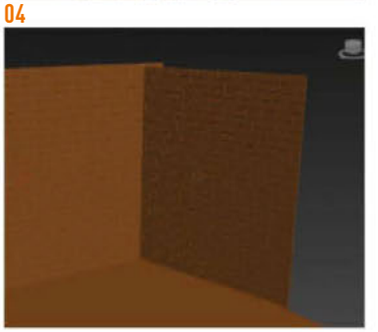
## 05 BLOCK THE ENVIRONMENT

With the character model completed, I started blocking out the environment. I wanted to create a really simple composition, so I used basic primitives to find the best composition for my character. This process actually involved me trying different approaches. The first idea was to do a kind of beach background, but I ended up going for a urban environment.



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## 06 MODEL THE RADIO

The radio was created directly in 3ds Max using poly modelling and basic primitives. I used the symmetry modifier and on top

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Aaron Dabelow's DebrisMaker plug-in is perfect for creating ground interest in scenes.

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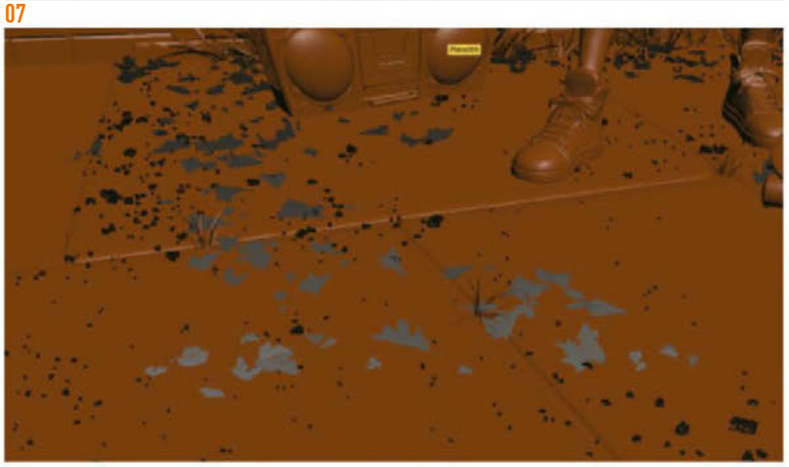

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of that I added taper and an FFD modifier to help me bring a little bit of interesting distortion to the radio. The same process was applied to the skateboard.

## 07 MODEL THE GRASS

The key thing when creating grass is the way you group the blades. I used a simple plane to create the first blade and then I duplicated and rotated to create the main grass clump. With that in hand, I started placing them close to the wall. I wanted them to by dynamic and not to be even and boring. With the help of Photoshop, I drew over the 3D shapes a few times to help me figure out where the best place to put them was.

## 08 DEBRISMAKER

Aaron Dabelow created this incredible free 3ds Max plug-in for creating debris. You can create rocks, leaves, brick wall, wood sticks, crystals, etc. I used the plug-in to add ground details on my scene.

## 09 INSTANCING OBJECTS

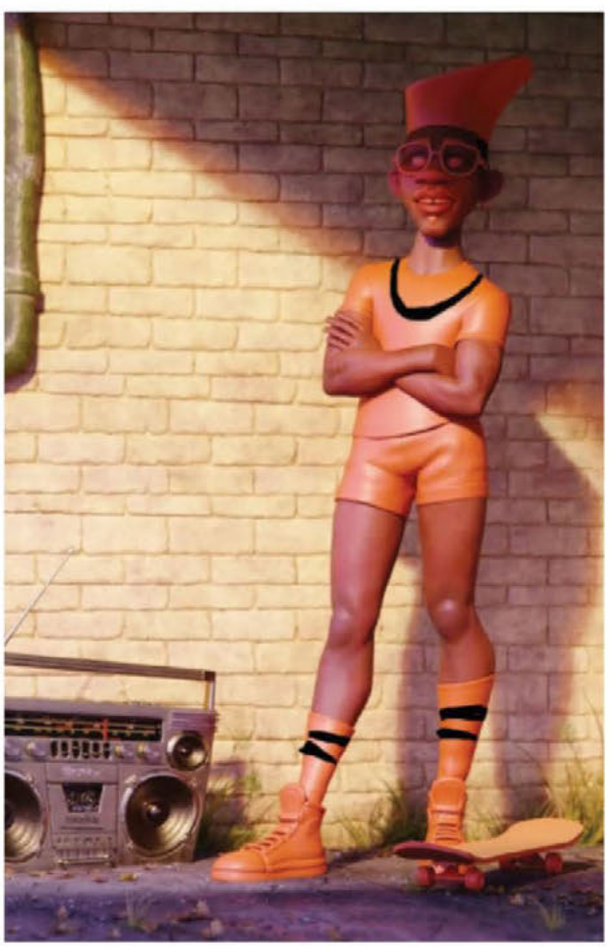
For distributing these objects in my scene, I used a plug-in called MultiScatter. I loaded my debris geometry in it and distributed in the sidewalk. I painted black and white maps to define the region I wanted to have stones or leaves. I also played a little with the scale and rotation to add variation and make things look as random as they are in the real world.

## 10 BLOCKING THE LIGHT

Before doing any development work, I create a very simple light rig. I used a V-Ray domelight and HDR to light my scene. That gave a base to start working on the textures.

## 11 DETAILING LIGHT

I added a V-Ray light to simulate the sun. To make it more interesting, I duplicated the key light and then made the area double the size and also over-saturated. This made the light more orange and saturated close to the shadow edge. This trick also helps to tone down the 3D feel in the render, so it looks a little more like a natural-media painting.



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## 12 THE SKIN SHADER

V-Ray 3.5 incorporated the amazing alShaders, which is my favourite SSS shader by far. I painted a basic colour map in ZBrush to give me warm/cold body areas. I tried to make the cheeks/nose more red and the beard, knees and elbow a little more blue. I added a seamless skin texture on top to add some details. AlShader is pretty straightforward, so I adjusted the SSS radius and added a skin seamless bump.

## 13 CLOTHING

The secret of creating clothing is mainly the bump map and adding some subtle fur on top. I used a 3D scan bump map, you can find awesome websites selling 3D scan textures. I used the Ornatrix plug-in to add fur. As material base, I used VRayMtl with a falloff texture in the diffuse. That gives a velvet effect and helps the clothes look realistic.

### Depth of field

To add extra realism to my renders, I always use a subtle depth of field in the camera. That helps to break the 3D aspect a little and gives a more photographic look. In V-Ray you can play with the Center Bias option to give a more organic feel.

To add details, I created a basic brush in Photoshop and painted stitches on the UV.

## 14 CREATE BELIEVABLE EYES

The eyes are the most important part of the character creation. The eye model was divided in two geometries – the inner and outer geometry. That helps to give a more realistic appearance to the character. I used alShader to add a bit of SSS and avoid it looking like a ping pong ball. An important thing to remember is to add the little specular in the lower part of the cornea. For that, I used a V-Ray blend material and masked out the cornea to have reflection in there.

## 15 TEXTURE THE WALL

I started playing with geometric shapes in Photoshop. I used a random geometric picture that I liked and applied the


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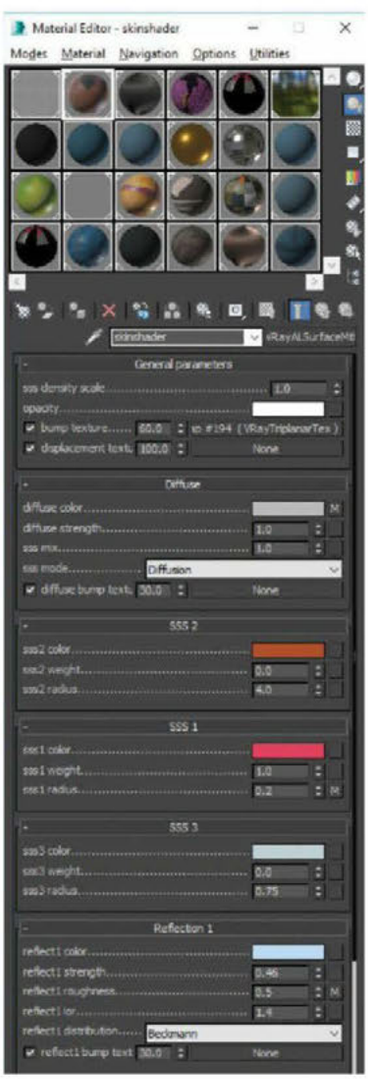


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Cutout filter. That removed all the information from the image. I then started painting over and doing render tests to balance the composition. Once I was happy with the shapes, I added detail like paint and water drips. I used a few wall textures in Overlay just to add a little more information and make it more realistic.

## 16 LEAVES AND GRASS SHADER

To give a translucent effect to the leaves and grass, I used the VRay2SidedMtl. You can set two different materials with two colours for each side of the geometry. That adds some cool colour variation. I created a few different materials with different colours to add some randomness to the objects.

## 17 GROOMING

For the hair, eyebrows and mustache, I used the Ornatrix plug-in as well. For the Afro hair I had a base mesh in which I added the hair on top. For the eyebrows and mustache, I brushed the guides the way I wanted and added a little frizz and clumping to make it a touch more organic. For the shader, I added the VRayHairMtl with some basic colour variation on the root and tip, and between each hair.

## 18 BALANCING

With everything textured in my scene, I started balancing things out. I spent most of my time adjusting colour saturation. One little object out of the colour palette can kill the harmony of your composition. So after many hours working on the technical aspects, it's important to step back and look at your image as if it were a painting, and try to take artistic decisions that will make a big difference to the final result.

### Personality is the key

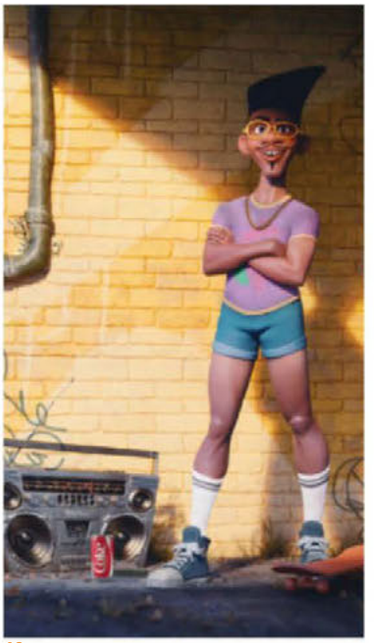
One of the most important aspects of creating characters is the personality. You can make an incredible character but if the pose, outfit or hair doesn't reflect personality, people will not believe your character could exist.

## 19 RENDERING

I wanted to get the best quality I could from V-Ray so I decided to use brute force and go for primary and secondary GI engine. I set the bounces to around 10 and then left it to render overnight with the progressive render. I let it run for around 10 hours at the 3K resolution.

## 20 POST-PRODUCTION

In Photoshop, I added some basic colour correction such as Curves, Photo Filter and Vignette. To add a more photographic look to my render, I used the Color Lookup adjustment with a Kodak preset. That gives some subtle colour variation that is so hard to get purely from 3D. Once I was happy with the colours, I added some noise, chromatic aberration and lens distortion on the image.



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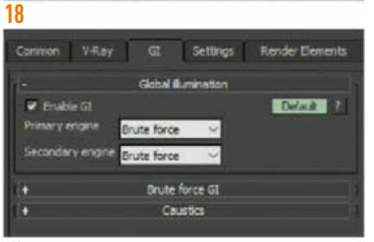


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# EXTERIOR SCENES IN 3DS MAX

**Oscar Juárez** shares his workflow for creating photorealistic exterior scenes using 3ds Max, V-Ray and Photoshop

AUTHOR

**Oscar Juárez**
Oscar Juárez is an architect who loves creating CG stuff – he has had his own studio based in Mexico City called Fibrha Studio since 2010.
http://www.fibrha.com/

Creating archviz scenes always offers a unique set of challenges, usually based around trying to present the client with an image that lives up to their vision. On a technical level, the real work is in making something that looks real – the client can't use work that doesn't feel right to the viewer.

Exterior scenes present an extra raft of hurdles that need to be overcome. In addition to ensuring that buildings are realistic, you need to think about the environment they sit in, and what extra details are needed to make the scene feel more like a photo than a 3D render. You need to create a snapshot of how the architecture can sit within its destined boundaries.

The problem this represents is that not only are you aiming to provide your client (be it an architect, project manager or the end user/home owner) with a representation of the building but it has to cover many basis. Not only does it need to look realistic and feel like a photograph, to aid in believability, it also needs to serve as inspiration and motivational material for the people concerned. This might be one of the fist times the client will be able to see the project in situ and that can be one of the milestones for them. With this in mind, the final composite has to have just enough stylisation to feel special. Having perfectly clean materials lit by bright sunlight is all well and good but won't sit in the plate properly, yet adding too much grunge and a cloudy sky, has the same problem but from the oposite end.

This tutorial will show you how I approach creating this kind of scene that will please clients as well as your own sense of artistry.

You'll choose your reference material, plan which elements need to be constructed in full 3D, or added as photomanipulations in post. Set up your render using V-Ray, including using V-Ray's sunlighting tools,

Finally you'll take your renders into Adobe Photoshop, to bring it all into a cohesive whole.

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**EXTERIOR ARCHVIZ SCENES**
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## 01 GATHER REFERENCES

The very first step I take in every creation is to gather references. This way I know where I want to go. In some other cases, they can be used as a start point to be taken into my 3D software where I can make adjustments and end up with a totally different outcome than the original image.

## 02 BEGIN TO MODEL

Once you have your image sorted, the obvious next step is to model it. It doesn't have to be detailed just yet – we need to be able to easily move and change elements. Keep advancing and setting the final cams and you can see where to add more details.

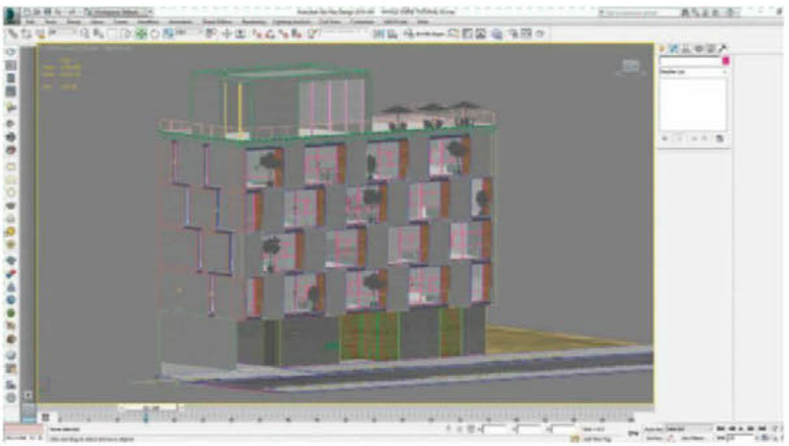
## 03 ENVIRONMENTAL DETAILS

The surrounding environment is key for a successful and realistic visualisation. In this step we will add 3D elements in our scene so we can have a more complete image. The ones I set in 3D are the ones I think I will need to render, since I always add more stuff in Photoshop, for example grass and human figures.

## 04 GET THE RIGHT CAM

Now we have finished adding the environment to the model, we can add our cam. Most of the time a client's cam looks okay, but we can modify them so the scene looks even better. In this image, I added a V-Ray cam and set it in a place that looked good.

**Blocking**
The initial model is a simple one, used more as a placeholder than a renderable asset.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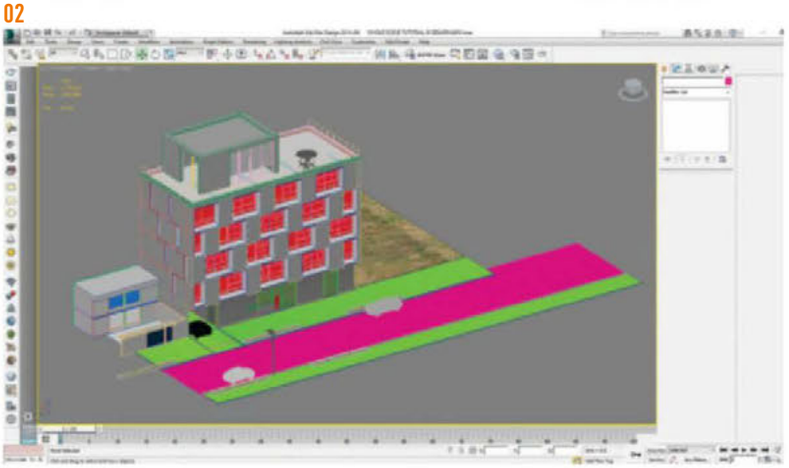
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## 05 CREATE MATERIALS

I prefer to create basic materials and if there is a place where I need something special or I come up with a new idea, I will then increase the complexity of the materials. In this scene the most complex material is the asphalt. All the other materials are going to stick to basic settings.

## 06 APPLY MATERIALS

With the materials and the model set, the next thing is to apply them. One of the most important things is to keep the UV mapping as realistic as possible. It's a common mistake to have a correct material only for it to be mapped incorrectly.

## 07 FINAL LIGHTS

It's time to set the final lighting. I'm going to use a V-Ray sun so I can set the final shadows, reflections and so on. Once you are happy with the lighting, save that V-Ray sun and add another one, slighting altering the parameters. Don't settle with your first lighting setup. Adding more makes it easier to develop the lighting. Once you are happy, save.

## 08 RENDERING SETUP

Rendering time is always an issue. Let's use a setting I often

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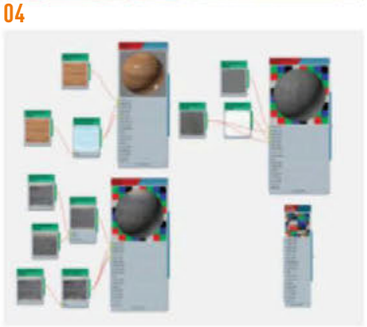
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pick to have low rendering times. You can modify it and see how you can apply it in your renderings. We will use light cache and irradiance map to process the lighting, but the important thing is to save the elements as Targa files.

## 09 LAYERS

Once it's all saved we have to load it in Photoshop. We are going to add each element and make adjustments to some of them. We will adjust using the Curves and Hue/Saturation commands.

## 10 BLENDING MODES

The main tool for adding elements into an image are Photoshop's blending modes. Most of the time we will use Soft Light and Screen but in some cases this may vary. As you add elements into Photoshop, simply set the proper blending mode.

## 11 ORGANISE THE LAYERS

Keeping everything in order during post-production is very important. The best way to do this in Photoshop is to group your

### Render setup

V-Ray offers many options for control and quality of your final image. Make use of render Elements, such as depth passes for easy adjustment in post.

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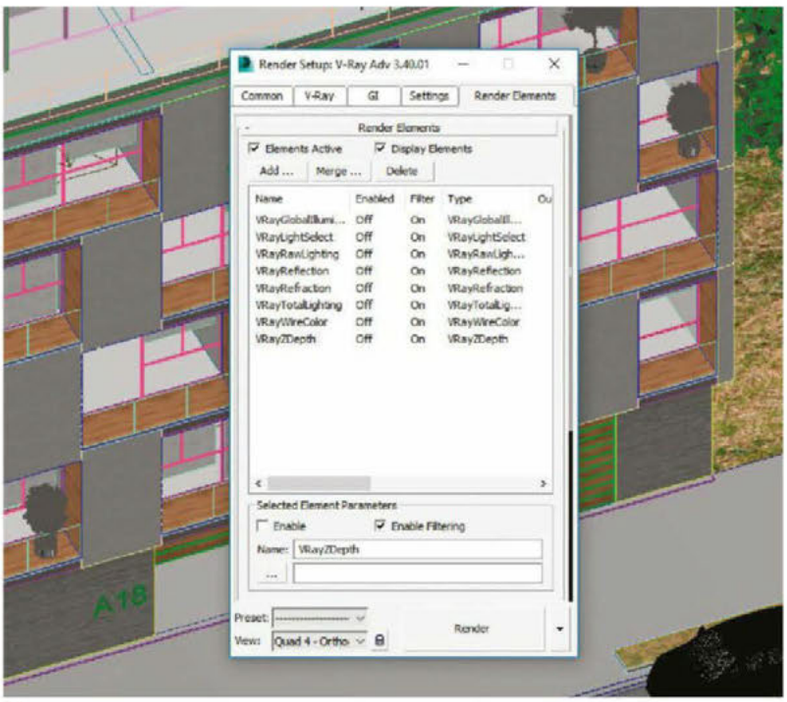


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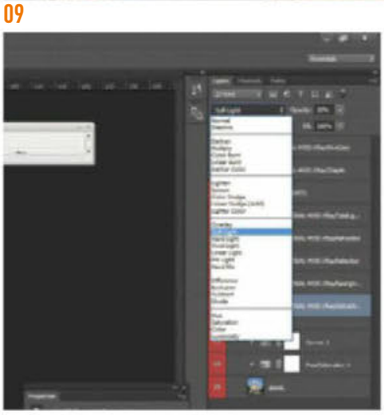

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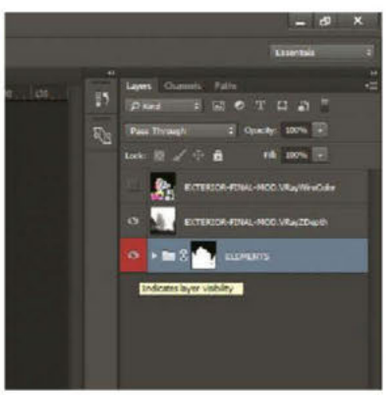

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layers and also assign colours to the folders. Plus, get in the habit of naming your layers.

## 12 USING DEPTH AND ALPHA CHANNELS

Once all the elements are in Photoshop with the blend modes assigned, use the ZDepth pass. Rasterize it and press Ctrl/Cmd+I to invert, now set to Screen mode and alter Opacity. Go to the Channels panel, select the Alpha channel and in the Layers panel, select the elements group and create a mask. That way we clear the background.

## 13 ADD THE BACKGROUND

Now we have an empty background, it's time to build one we want. Start with the sky – pick one matching the tone set for the lighting. Also, find a nice image for the lower part of the background. After this is decided, extra details in the sky can be added.

## 14 GRASS AND THE FINAL SKY

The main thing for grass is creating the correct mask and the correct brush. In this case I added the mask and pressed Ctrl/Cmd+I to invert it, then I selected the grass base with the wirecolor element and created the base. After that, I used the brush for the rest of the bushes. The Hue/Saturation command helped to match the tone.

## 15 HUMANS FOR SCALE

Adding scale to an image makes a big difference. Humans are always good for arch-vis, not only for scale but to bring movement and life. Whatever you use, always ensure the highlights and shadows are correct. Adjust colours if needed with Hue/Saturation and apply the Motion Blur filter in places for a dynamic feel.

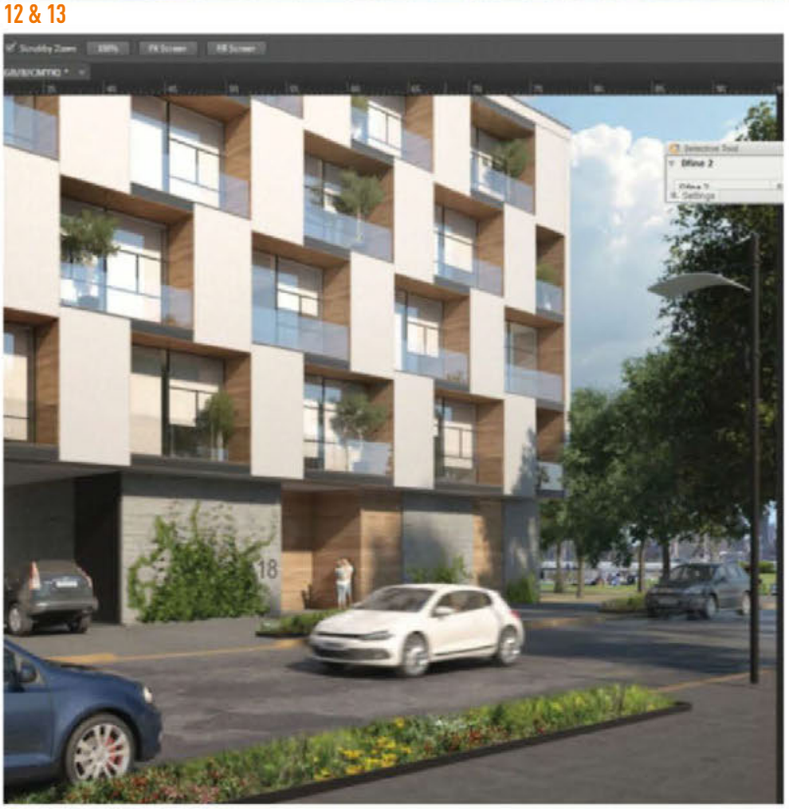
## 16 FINAL TOUCHES

Add a black-and-white effect and set it to Soft Light, change the value to your liking, and then add a Color Balance adjustment to tweak specific colours. I decided to add a flare I got from VizPeople to add a nice effect. Once everything is done, save the image and open in Photoshop again. I used the Color Efex Pro 4 plug-in to apply the Cross Processing effect. •

### Chance of clouds

Adding the sky is a good time to introduce some extra interest to the image, with details where you need them. Adding clouds nearer the horizon makes for interest without overwhelming the clean blue sky.

12 & 13



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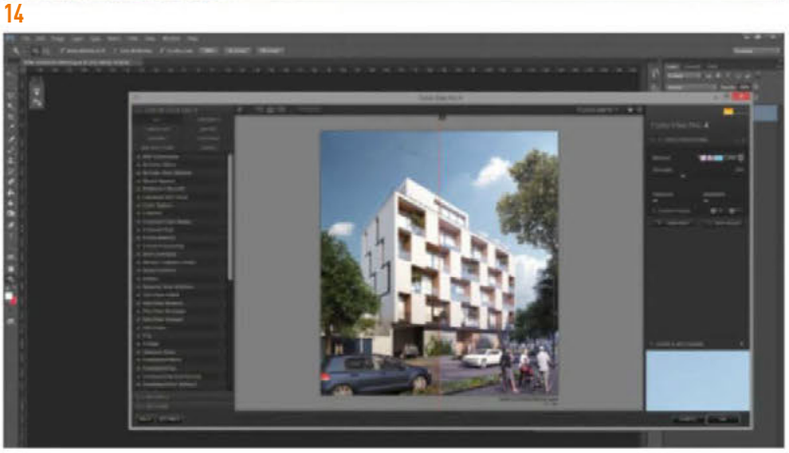

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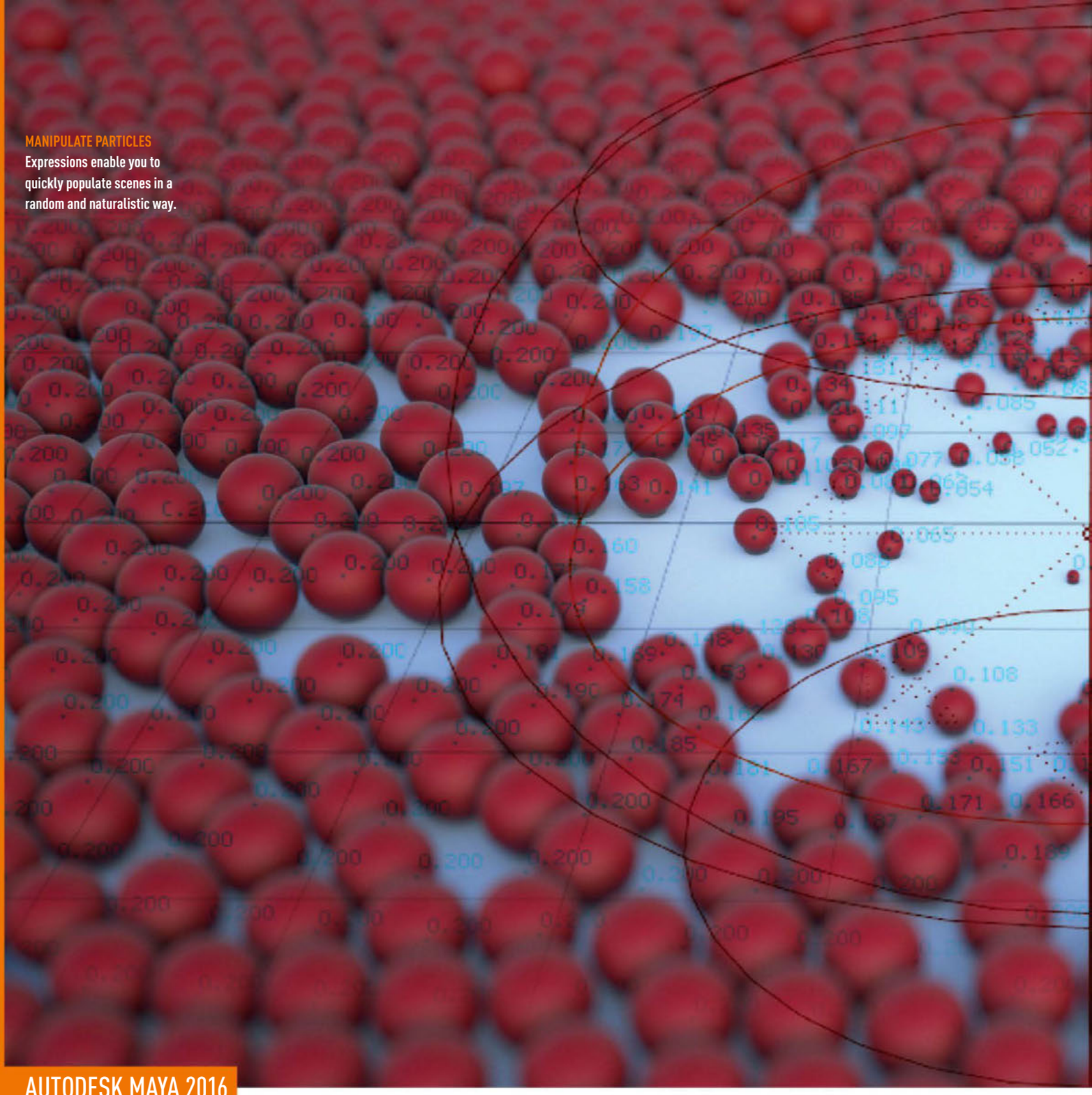
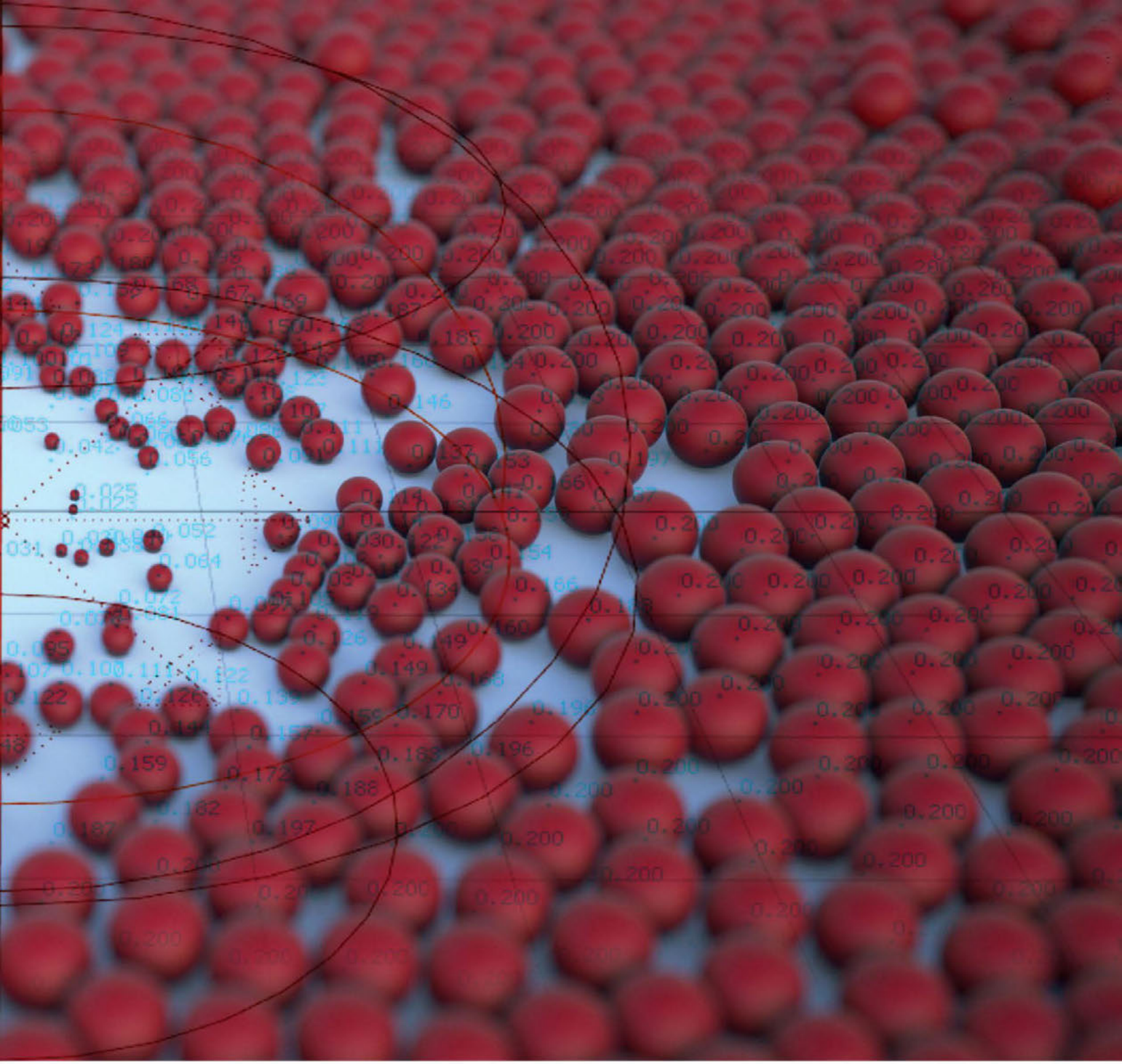


MANIPULATE PARTICLES
Expressions enable you to quickly populate scenes in a random and naturalistic way.

AUTODESK MAYA 2016

# USING EXPRESSIONS TO MANIPULATE PARTICLES IN MAYA

**Syawish A Rehman** shows how to use MEL and Python in Maya to give values to Per Particle attributes based on coding



In Maya, nParticles are one of the most powerful features in your toolkit. Not only can you do amazing things with them, but you can also create expressions to manipulate every single particle. You create an expression and Maya actually evaluates on every frame what that expression dictates and manipulates each particle accordingly. The Maya expression system in itself is very powerful, so the possibilities of what you can do with expressions in Maya are limitless.

In this tutorial, we'll create a simple forest scene using nParticles and I'll show how to use expressions to make the forest look random and realistic, as well as how to create a field to control any attribute of the particles. For example, you can create a field to control the scale of the trees, as we'll do, and the trees inside that field will be smaller or larger than the others depending on what you write in the expressions. We'll be using a field in this case because it has a magnitude that can detect what particles are being influenced. You'll learn the basics of manipulating any attribute of every single particle in a particle array using expressions. You'll also learn where all the attributes are actually hidden and how to activate them.

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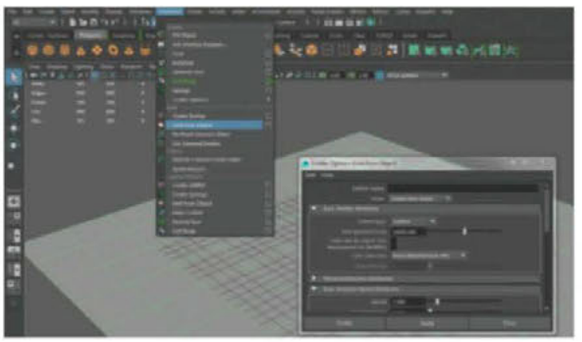
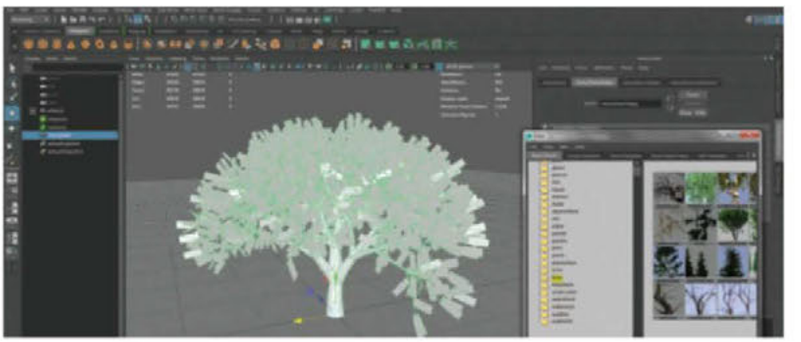
AUTHOR

**Syawish A Rehman**
A motion graphics and VFX artist from Pakistan with nine years' experience, Syawish loves motion graphics and making video tutorials.
www.bit.ly/syawish



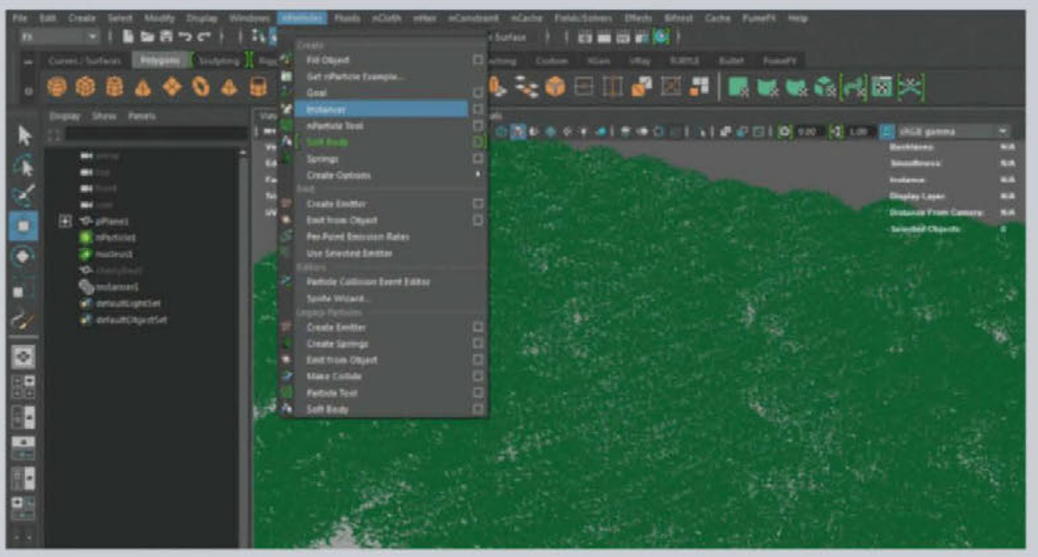


## 01 CREATE AN EMITTER

Select the mesh you want to emit particles from. Under the FX module in Maya, go to the nParticles menu. Click Create Emitter>Emit from Object. In my case, I'll be emitting particles from a polyplane. Once you've created the emitter, turn the Gravity and Speed to zero in the Nucleus node and the Emitter node respectively. Key the emission rate to stop emitting.

## 02 PREPARE YOUR GEOMETRY

For this tutorial, I'm going to create a couple of trees to use as instancing geometry to place with particles over the polyplane. If you want to follow what I'm doing, just go the Windows menu bar and under the General Editors submenu, find Visor. This contains many types of useful objects. Under Trees, select Cherry Tree and then draw it on your surface with a paint stroke. Afterwards, simply convert the mesh from paint stroke to polygons and combine the leaves and the trunk.

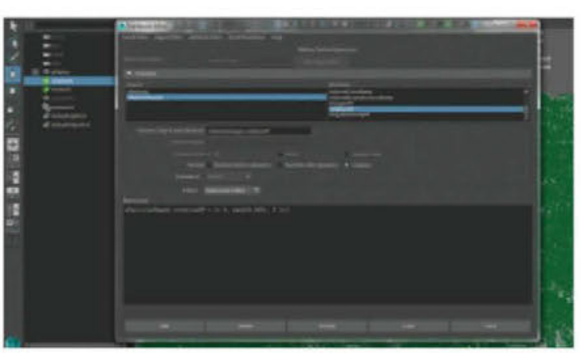


## 03 INSTANCING GEOMETRY

First of all, delete the history on your geometry and freeze transformations. Select the instancing geometry first, in this case, the tree mesh, and then select the nParticles node. Under the FX module> nParticles, find Instancer and click it. Now, you should see all the particles you had created replaced with the Tree mesh that you had selected. All the copies of the tree mesh have the same attributes, so we have to add some randomness.

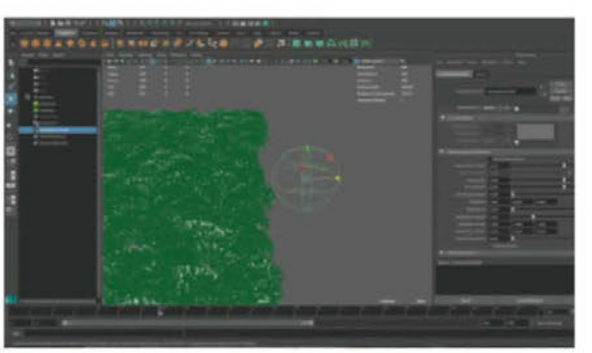
**Read the code**

In this tutorial, the lines of code are written in quotation marks to highlight them. Those marks shouldn't actually be included, and you need to end every command with a semicolon.



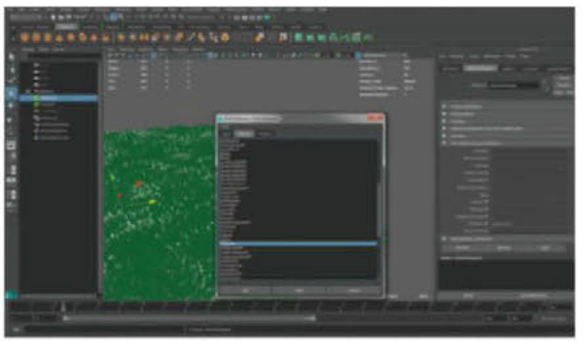
## 04 RANDOMISING ROTATIONS

Under the nParticle node, go to the Rotation tab and turn on Compute Rotation. Go to the Per Particle (Array) Attributes tab, right-click the Rotation PP field. Click Create Expression. We only want to add some rotation in the Y axis. A simple expression can be used. Enter "nParticleShape1.rotationPP = << 0, rand(0,360), 0 >> ;" Check what your nParticleShape node is named.



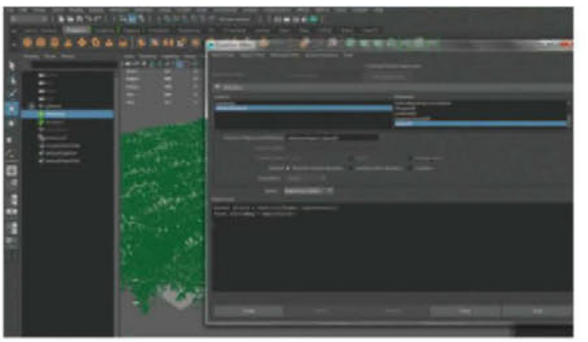
## 05 ADD A FIELD

Select the nParticle node and under FX module, go to Fields/Solvers. Create a Volume Axis field. It's set to push your particles away from its center. Change that under Volume Speed Attributes>Away from Center. Set to 0.01, which is neither complete zero nor large enough to do something. The shape of the volume can be whatever you want under Volume Control Attributes tab.



## 06 ADD RADIUSPP

Under the nParticle node, find the Add Dynamic Attributes tab. Here you can activate attributes similar to RotationPP. You should see three buttons; General, Opacity and Color. Click General. A new window opens with three tabs. Click the Particles tab and find radiusPP from the list. Click OK. You've activated the attribute to set an expression to manipulate the radius of particles.

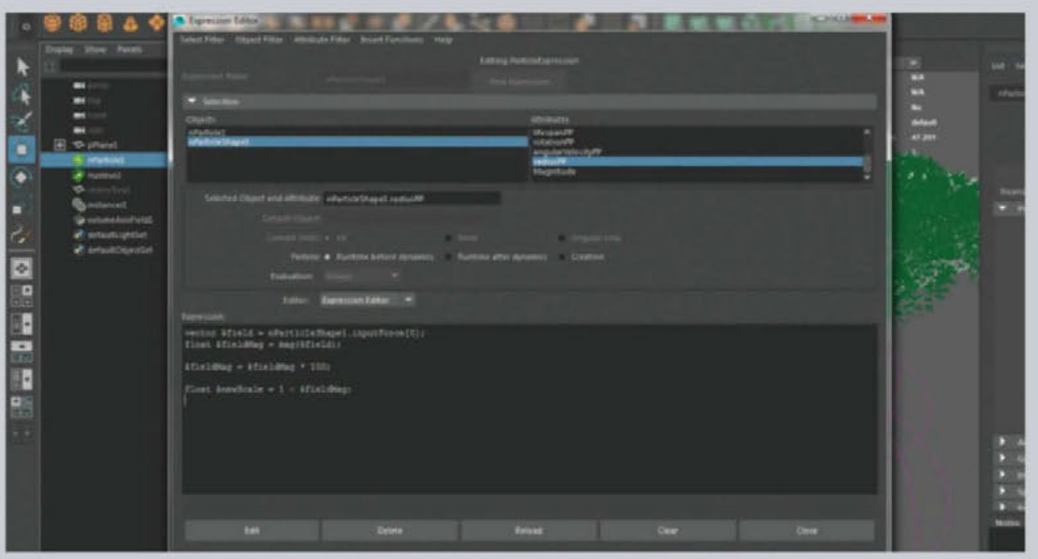


## 07 CONNECT VOLUME FIELD TO RADIUSPP

Right-click radiusPP field, click Runtime Expression before Dynamics to add an expression that will be evaluated before simulating a frame. Write "vector $field = nParticleShape1.inputForce[0];" to create a new vector variable and store the inputforce of the nParticle. Add float "$fieldMag = mag($field);" to create a float variable to store the magnitude of the variable just created.

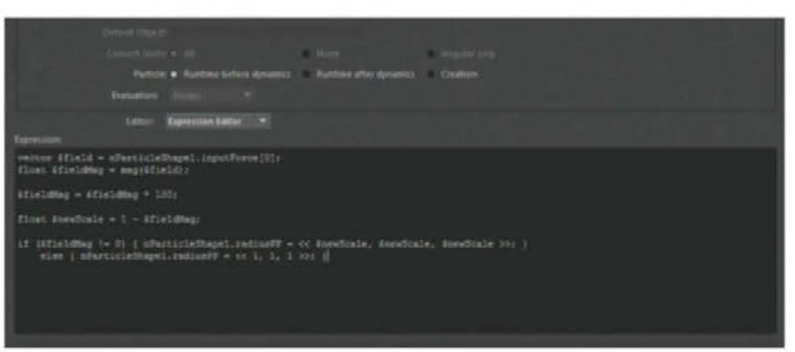
### Basic syntax of variables

In Maya, you declare a variable to store some kind of value. The two datatypes we used in this tutorial are Float and Vector. Float is a simple variable used to store decimal point value whereas Vector can store three values; X, Y and Z.



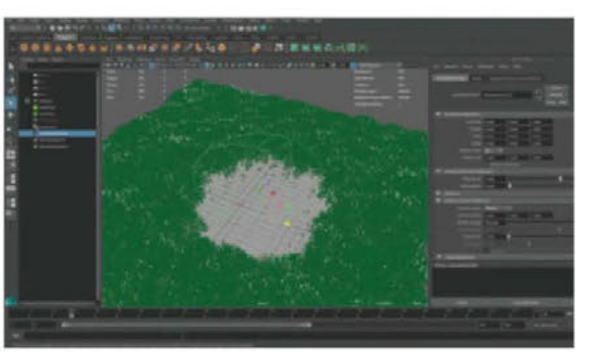
## 08 OFFSETTING VALUES

Because the Volume Field's force on the particles had to be so low, we need to multiple the fieldMag variable with 100 to get a fair value of 1. Simply add "$fieldMag = $fieldMag * 100;" This is only for your calculation, and doesn't have anything to do with the actual particles. They're still only taking 0.01 force from the Volume Field. Now, add "float $newScale = 1 - $fieldMag;" to store what the new scale for the particles will be.



## 09 CONDITION FOR SCALE

Now we have to add a condition where Maya evaluates if the particles are inside the Volume Field and if it decides they are, to then scale them down accordingly. Add "if ($fieldMag != 0) { nParticleShape1.radiusPP = << $newScale, $newScale, $newScale >>; } else { nParticleShape1.radiusPP = << 1, 1, 1 >>; }" This condition checks if the fieldMag isn't zero. If it isn't, it will apply the newScale to all three axes of the particles, otherwise it keeps the scale at 1.



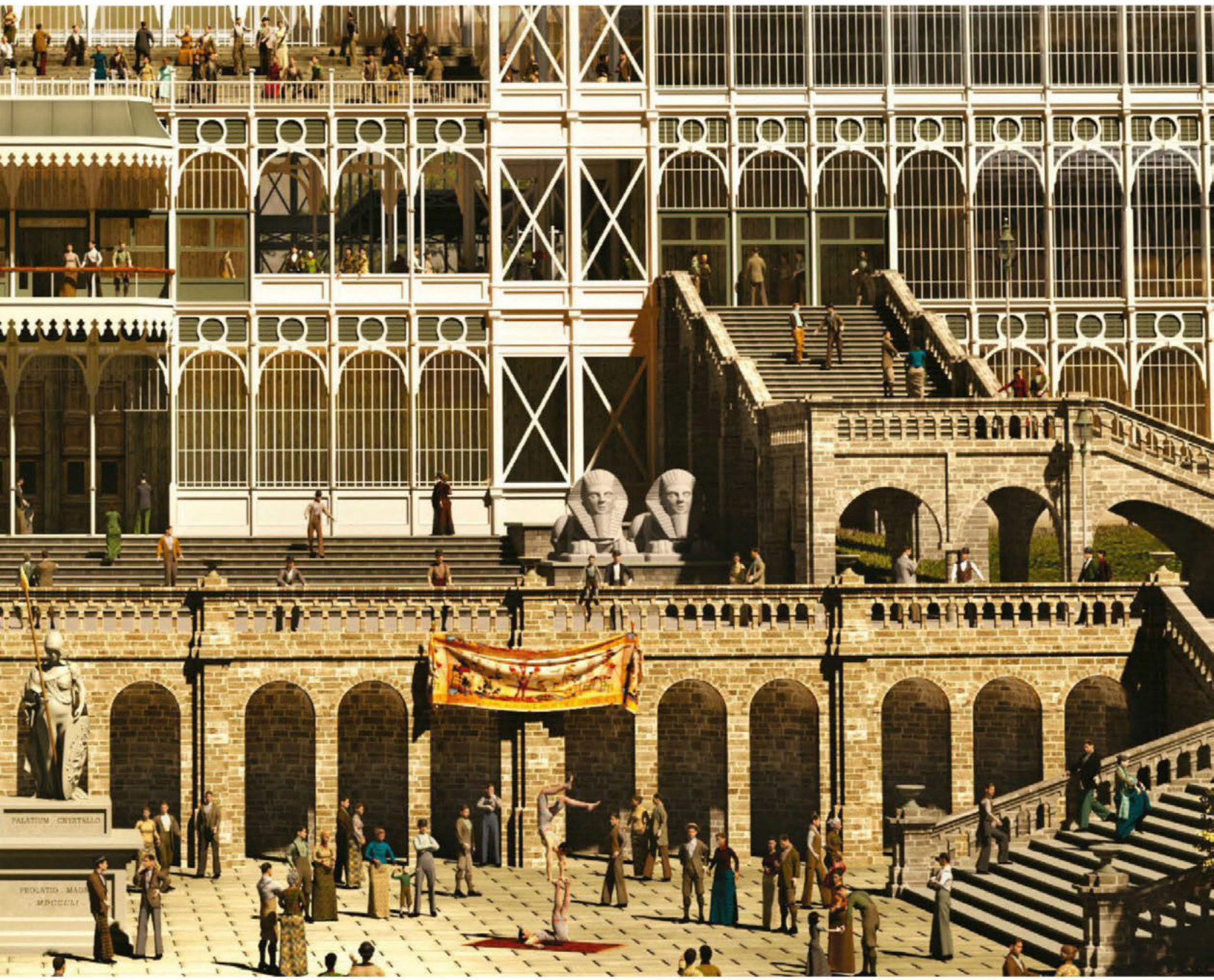
## 10 ATTACH CONNECTIONS

We have to tell Maya to get its values from the expression we just created. To do that, Under Instancer (Geometry Replacement) tab, check Allow All Data Types. Find the option for Scale and set to RadiusPP. Under the sub-tab called Rotation Option, set Rotation to RotationPP. This will apply randomisation in the rotation we created earlier. •


3DS MAX | MARVELOUS DESIGNER

# HOW TO POPULATE SCENES WITH MARVELOUS DESIGNER

**Simon Edwards** shares his basic principles for populating a large historic scene



AUTHOR
**Simon Edwards**
Simon works freelance at 3DArtvision. He has worked professionally both as an architectural visualiser and 3D artist for 20 years in Holland and the UK.
www.3dartvision.co.uk

A significant amount of the time taken in building this scene was inventing various scenarios and mini dramas for the people in the image. After sketching ideas over rough printouts, I could begin building individual characters.

The scene includes more than 160 individuals who, between them, share 140 different poses and five costume designs with additional variations in the choice of fabric patterns.

Marvelous Designer (MD) comes ready-loaded with a small library of basic characters that can easily be manipulated within MD (rather than importing avatars from 3ds Max, as I have done). However, I found the structure of those supplied by MD too muscular and not altogether correctly proportioned, hence why I also use 3ds Max. Before starting, I chose to export the T-posed avatar provided by MD and edit it in 3ds Max into a more natural form. By doing this you lose the ability to pose the form natively in MD, so I made a second copy ready-posed in 3ds Max to use, after it was dressed, as a morph target.

Any 'avatar' exported as an obj will work. In order to pose your character clothed you need to save a copy of the original T-posed character and the final posed character (bearing in mind, that while editing the posed form must retain the original vertex count of the T-posed character for them to morph correctly).

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## 01 RIG THE AVATAR IN 3DS MAX

Open the T-posed model, make sure the feet are standing at 0,0,0 and export a copy of the model as 'T.obj'. As this example pose will be seated, create a simple box to represent a bench for it to sit on. Drag a default Biped over the model, rotate and adjust the bones so they fit over the T form. Bind the bones to the mesh by adding a Skin modifier. Click on the Add button within the modifier list and select all the bones.

Hide the mesh and manipulate the bones into a pose using the move and rotate tools.

## 02 FIX ANY MESH DEFORMATIONS

Any large holes or lumps that have appeared after un-hiding the model can be corrected by selecting the mesh, clicking on Edit Envelopes under the skin modifier, and manipulating the control points with the Move tool. You can further edit and tweak the mesh using Mesh Edit with soft selection if necessary, but do not optimise or add any polygons while doing so because you must retain the original vertex count.

This doesn't need to be perfect as the body will, after all, eventually be hidden by clothes.

### Make it work

Textures exported within obj meshes do not easily transport between 3ds Max and MD, so the posed and textured mannequin is copied as a 3ds Max file to ensure we have a correctly textured and posed avatar, ready to dress in a 3ds Max format.

## 03 SAVE OUT A COPY

Once happy with the posed mesh, export it as 'pose.obj' and then separately, the box that it is sitting on as 'bench .obj'. Before leaving 3ds Max, make a snapshot mesh of the posed model (this is found under Tools in the top menu) and save out this new selected mesh as 'pose.max'.

Now you have a clean 3ds Max model of the posed avatar saved along with the skin textures, without any modifiers or bones attached.

## 04 BUILD THE DRESS

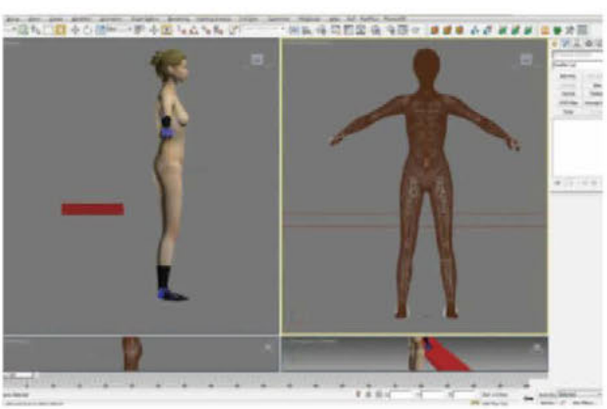
Open MarvelousDesigner and go to File>Import>OBJ and choose the T.obj file you exported in step 1. In the Import dialog, select Open and then Load as Avatar. Only 'Avatar' objects will interact with cloth simulation in MD. The avatar will appear but without the skin textures seen in 3ds Max. Drag one large rectangle (which will be the dress) over the legs in the 2D screen and one smaller one at waist level (which will be the dress belt).

## 05 DRAW FOLD LINES

Create fold lines on the rectangles by selecting the Internal Polygon/Line button and clicking (in the 2D screen) first on one edge of the rectangle and then twice on the far edge to finish the line. Create two folds on each rectangle in order to wrap the flat sheets around the avatar as a three-sided box. Select each rectangle individually in the 3D screen and manipulate them so they're up close, and in position with the avatar.

## 06 FOLD THE DRESS

Select one of the fold lines in the 2D view and then the Fold Arrangement button found in the tools above the 3D screen. Click on the fold line in the 3D screen and a disc will appear with green and red arrows. Select one of the arrows,



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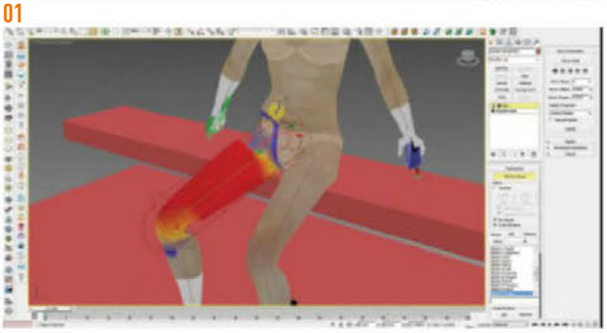

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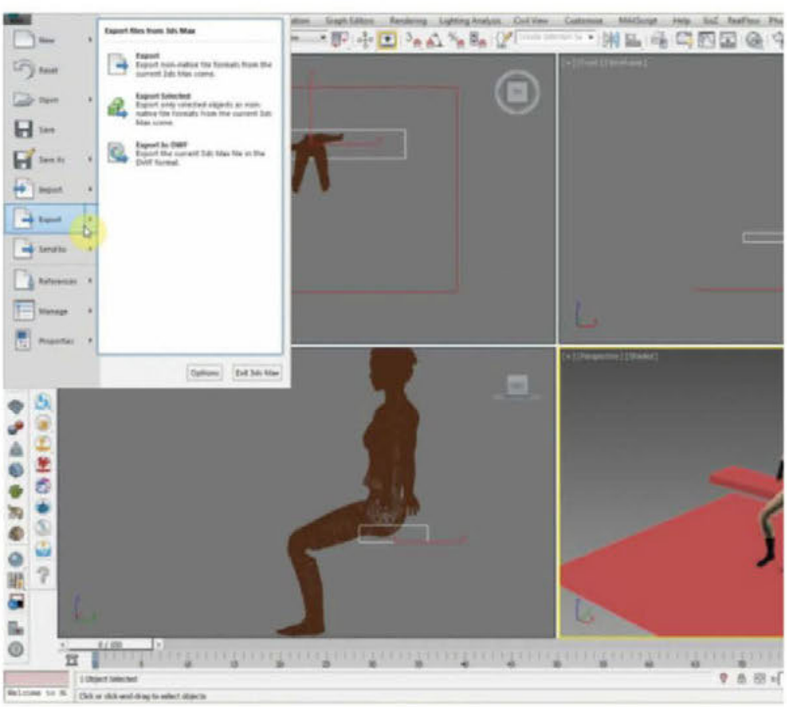

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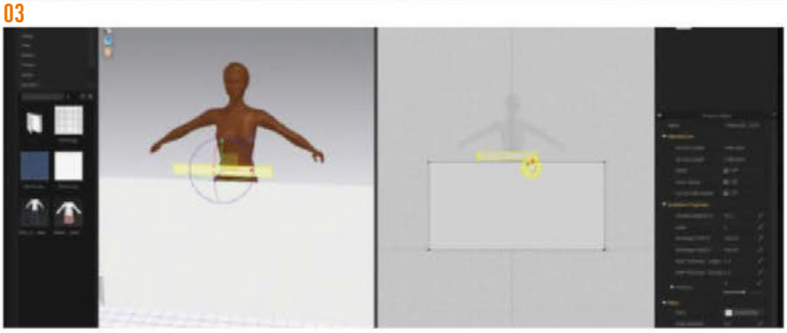

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click, hold and drag on this and that portion of the rectangle into which the arrow points will rotate (fold) around the fold line. Repeat this with all the fold lines until you have bent the rectangles into three-sided boxes. Then move each one of these so they roughly surround the avatar's legs and waist.

## 07 SEW THE DRESS

The edges of the three-sided cubes we have now made need to be sewn together to complete the dress form. Select the Segment Sew button in the tools above the 2D screen and then within the 2D screen, select the bottom edge of the small rectangle (belt) and then the top edge of the large rectangle (dress). When you do this, you can see in the 3D screen that fibres have been stretched between the two plains to represent stitching. Do the same with the two far edges of the dress and also the two far edges of the belt.

## 08 EDIT THE SEWING

Look in the 3D screen to check where the threads have been stretched between panels. If any are attached to the wrong panel, then select the Edit Sewing button above the 2D screen, select the sewing line in the 2D screen, delete it and then do it again.

**Check patterns**

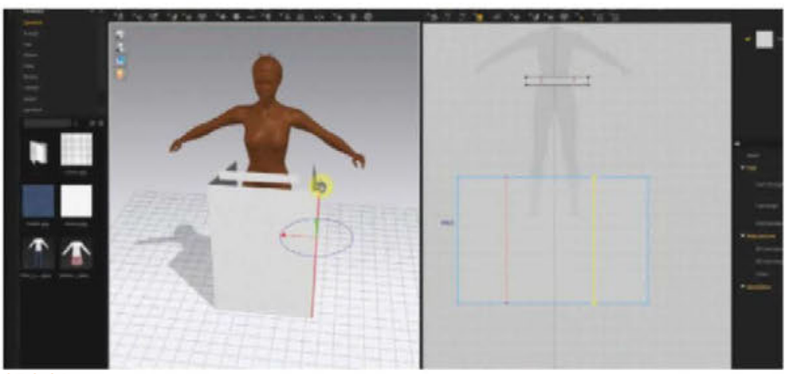
As a reference you can easily find various tailor patterns posted on the web or just study a piece of your own clothing to get an idea of the shapes you need to create.

## 09 SIMULATE AND ADJUST

Press the Simulate button (or use the space bar) and the dress will flop around the avatar. While the Simulate button is activated, you will be able to grab the fabric in the 3D view and pull it up and around in a real-time environment. If you have made the belt too loose, it may start sliding down the figure, so grab it and drag it up again before quickly hitting the Simulate button to stop the movement. Go back into the 2D screen and make the belt shorter, if needed, lengthen or shorten the dress and then finally delete the fold lines. Re-simulate.

## 10 CREATE A BUSTLE

In order to make the dress wider at the top and give the impression of a bustle, select the Internal Rectangle button, found in tools above the 2D view, and draw a rectangle inside the 'dress' rectangle along the top edge. Edit that rectangle so it extends over the top and sides of the dress shape. With the Internal Rectangle selected, go into the Property Editor and under Bond/Skive, tick the box Bond. This will effectively stiffen the area of dress covered by the small rectangle. Stiffness parameters can be adjusted under ›



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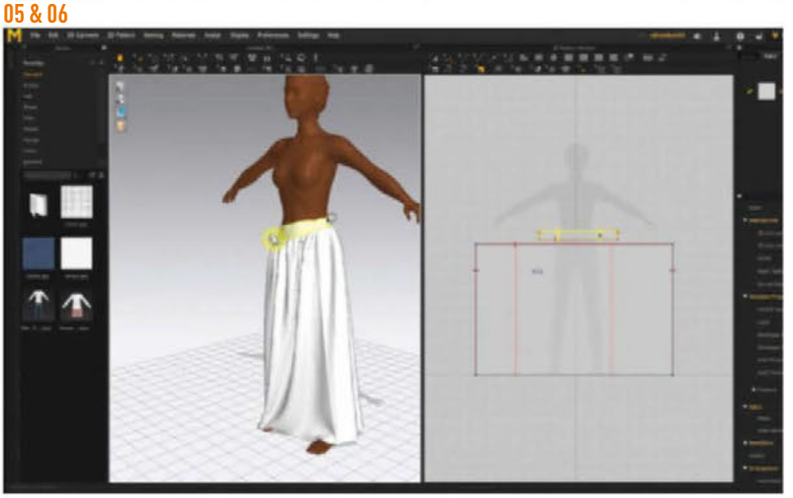

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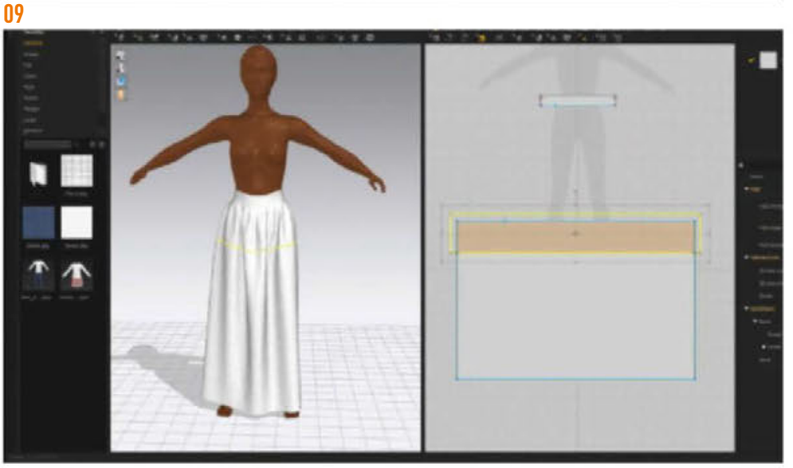

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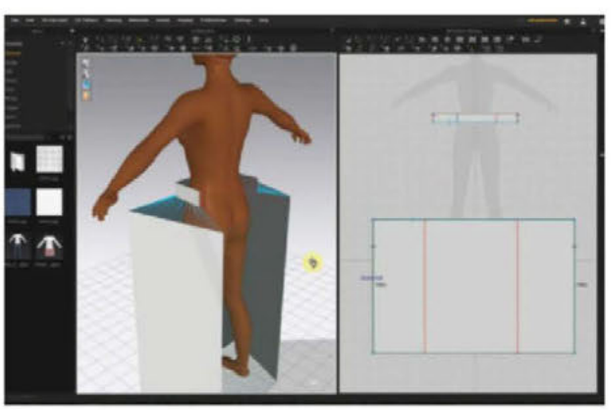

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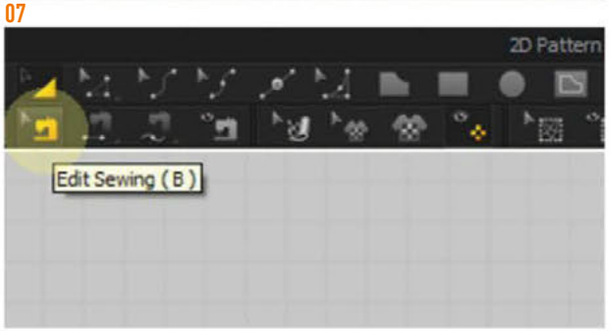


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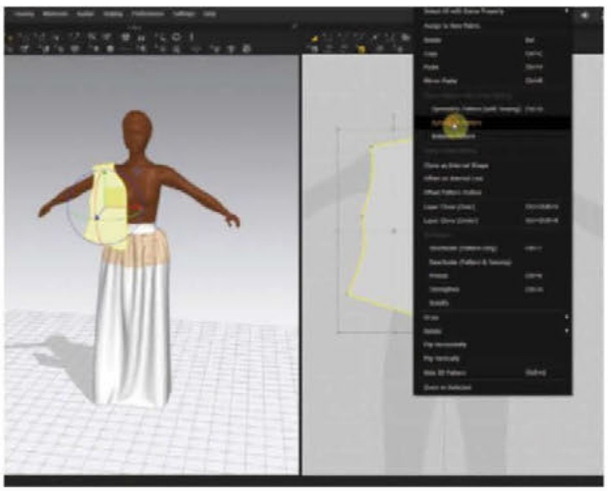

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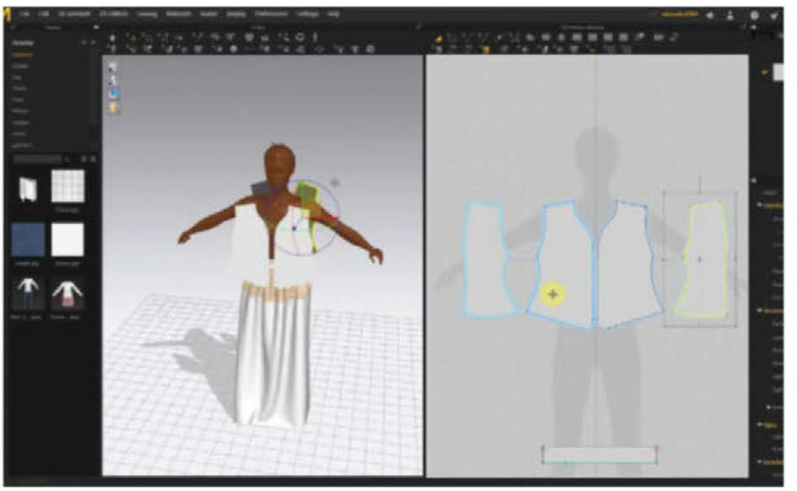


13 & 14

the Detail drop-down list just below. View the result in the 3D view with Simulate on.

## 11 JACKET RECTANGLE

In 2D view, start by moving the two dress rectangles down and out of the way, then create a new rectangle over one side of the chest and abdomen. Move the vertices around and edit the shape with the various vertex tools nestled above the 2D screen to tailor a pattern for one of the two front panels of the new jacket.

## 12 USE SYMMETRY

Once you are satisfied with the form, right-click on the 2D shape while holding down the Shift button. Then from the dialog box that appears, select Symmetric Pattern and drop a new (symmetrical and instanced) panel beside the first. Make sure the two jacket panels are sitting in the correct position relative to each other and in front of the avatar's chest on the 3D view.

## 13 COPY AND PASTE

Hold down the Shift button and right-click on either of the two panels in the 2D view and choose Copy. Then with the Shift button still held, right-click elsewhere on the screen and select Paste. Drop a new shape beside the front panels. This will be one of two rear panels, so move and rotate it into place to the back of the avatar in the 3D view and be sure the shape 'normals' are pointing in the right direction (lighter faces should be facing outward, while darker faces should face inward).

### Flip Normal

Instead of clumsily rotating shapes around to face normals correctly, right-click on the shape in the 3D view, with the Ctrl button held down, and select Flip Normal in the dialog box.

15

## 14 SHAPE TO FORM

Now manipulate the vertices on the back panel to re-shape into the required form. The web can be useful as a reference point here by searching for tailor patterns, or by looking in your own wardrobe. Hold down Shift and right-click on the new rear panel, select Symmetric Pattern and drop a copy over to the opposite side on the 2D screen. Adjust the positioning of the panels around the avatar.

## 15 SEW THE JACKET

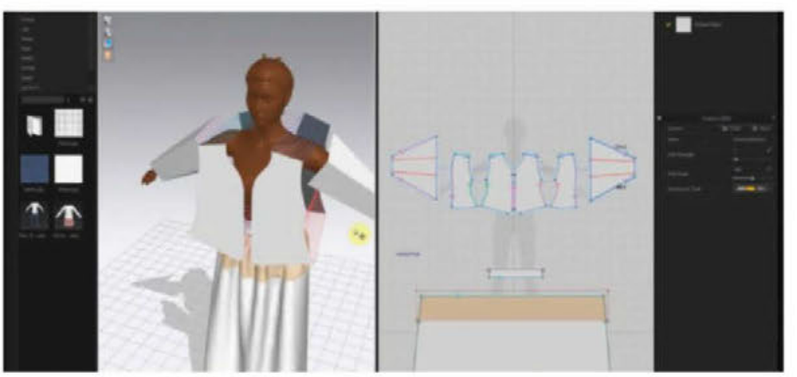
Select Segment Sewing from the tools above the 2D screen and go around all the 2D jacket patterns, clicking first on one seam edge and then onto the opposite one to which it is to be sewn up against.

To close the jacket at the front, I have made a custom sew line using the Free Sewing button. When using this, click where you want the sewing to start on the first edge, click where it finishes along the same edge, then move the mouse over to the opposite panel that it will be sewn against, click where the sewing starts and then finally where it ends.

## 16 MAKE THE SLEEVES

Drag out a new rectangle, approximately to the length of the sleeve. Edit to make the shoulder end wider than the cuff end, resulting in a trapezium shape (I want to have more fabric around the shoulder in order to make the sleeve look 'puffed out').

Draw two fold lines from shoulder to cuff with the Internal Polygon/Line tool. Move the trapezium along the length of the arm in the 3D screen and then using the Fold Arrangement tool, fold the form around the arm as is described in step 5. Sew the two edges along the length using the Segment Sewing tool.



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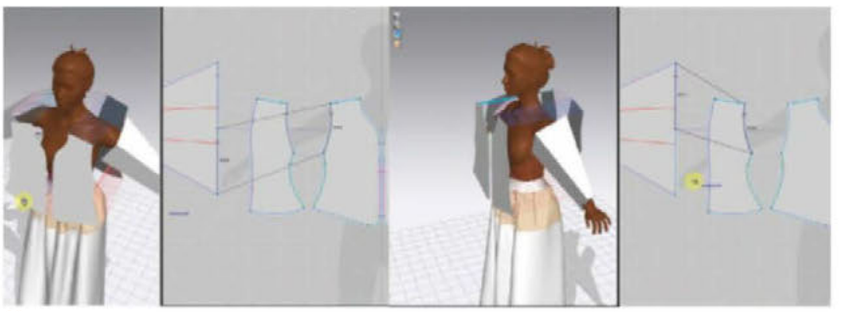

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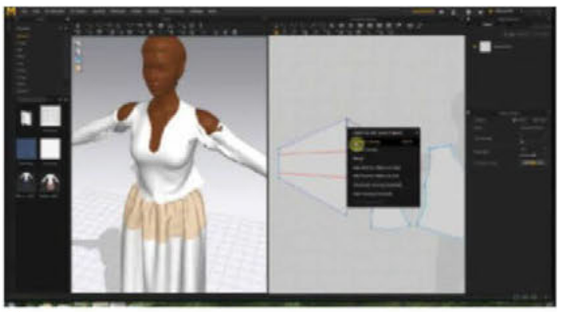

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## 17 MORE SYMMETRY

With the Transform Pattern button selected, hold down the Shift key and right-click on the sleeve in the 2D screen. Select Symmetric Pattern and then drop a copy of the sleeve over to the opposite side of the layout in the 2D view. You should see the sleeve appear, correctly positioned, around the opposite arm of the avatar in the 3D screen.

## 18 SEWING THE SEAMS

The wide edge of the trapezium needs to be sewn to both the front and rear panels of the jacket as the seam circles around the arm. Using the Free Sewing tool, start at the top, wide end of the trapezium and finish approximately half-way down. Then move over to the front panel, start again at the top of the arm opening and finish at the bottom. Next, go back to the trapezium and start again, but this time from the finish point of the previous sew line (approximately half-way down) and finish down at the bottom. Then move over to the relevant rear panel, this time start at the bottom of the arm opening and finish at the top.

## 19 SIMULATE

Press the Simulate button and watch the jacket form itself around the avatar.

While using Free Sewing, it is easy to set the start and finish points on opposing panels in the wrong places, resulting in the sewing becoming twisted. In the example illustrated here, I have purposefully positioned the sleeve start and finish points wrongly and the sleeves have twisted themselves into a knot. To correct this, select Edit Sewing, right-click (with Ctrl held down) over the troublesome sewing line in the 2D view and select Reverse Sewing. Press space bar again to start simulation and the sleeves will correct themselves.

### Thick first

When exporting an obj from MarvelousDesigner with a thickness to the fabrics, tick the Thick box before anything else. If you instead work your way down the dialog box from top to bottom and then tick on Thick, the selection settings you've already made revert back to default.

## 20 MAKE ADJUSTMENTS TO THE JACKET

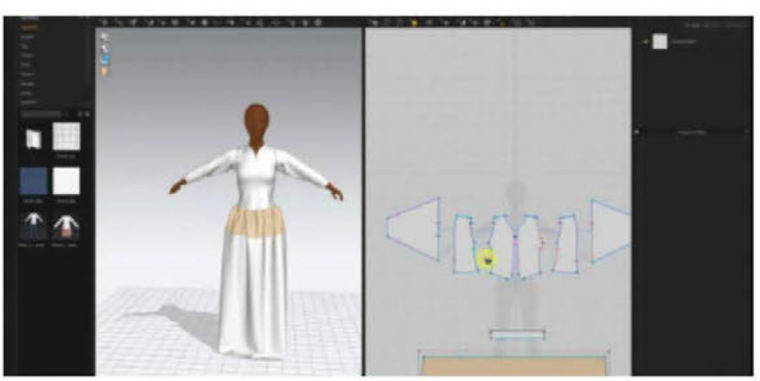
Now delete the fold lines from the sleeves. Keep the Simulate button active while carefully moving vertices and adjusting curved edges in the 2D view. You will instantly see the result moving in real time in the adjacent 3D view. You can further move over to the 3D screen and pull edges of the clothing to adjust how it hangs on the avatar. Continue tweaking like this until you are satisfied with the result.

## 21 PUFF OUT THE SHOULDERS

Just as the sleeves of the dress was 'puffed out' in step 16, the shoulders can also be given some stiffness to make them look more puffed out. Go through the same steps as outlined in step 16 but this time draw the rectangle over the wide end of the trapezium-shaped sleeve. Working on just one sleeve will affect both, as they are instanced. Once again, with the Simulate button active and while watching the result in the 3D screen, adjust stiffness settings in the Detail drop-down list after an internal rectangle has been 'bonded' over the sleeve.

## 22 ASSIGN PROPERTIES TO THE FABRICS

To the right of the screen under Object Browser and with the Fabric tab selected (default setting), click on Add to add a new fabric. Go to the Property Editor below and rename to 'dress'. Under Material, click onto the icon with four dots set in a square shape to open



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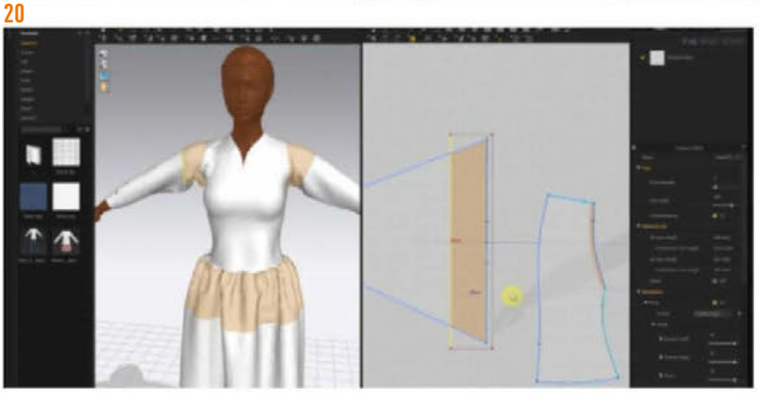

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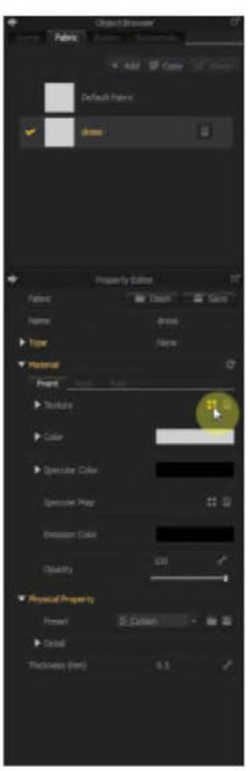

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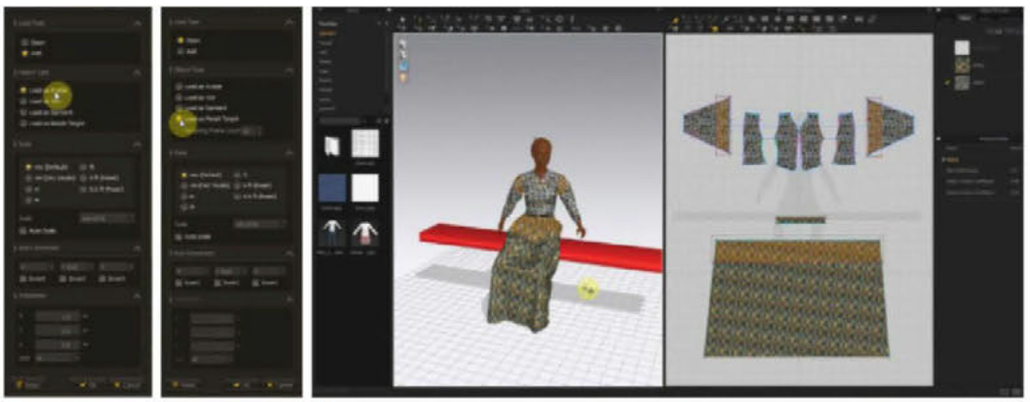
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a browser, where you can search for image files to apply a pattern. Further down the list, under Physical Property, choose a preset to suit the fabric characteristics of your clothing item, such as cotton, and adjust the thickness if necessary.

## 23 SCALE PATTERN

Select the dress in the 2D screen and under Property Editor, choose the fabric created in step 22 from the drop-down list beside Fabric. From the tools above, click on the icon that looks like a roll of carpet, Edit Texture, and a UCS will appear in the top-right corner. Zoom in closer to the dress shape and make sure it is selected (when selected the UCS will turn orange). As you hover over the UCS, the control arms will light up in yellow. Click, hold and drag over the 45-degree line in the UCS to scale your pattern larger or smaller.

## 24 IMPORT THE BENCH AND POSE

From the File menu, choose Import>Obj and then search for the 'bench.obj' file that was exported from 3ds Max in step

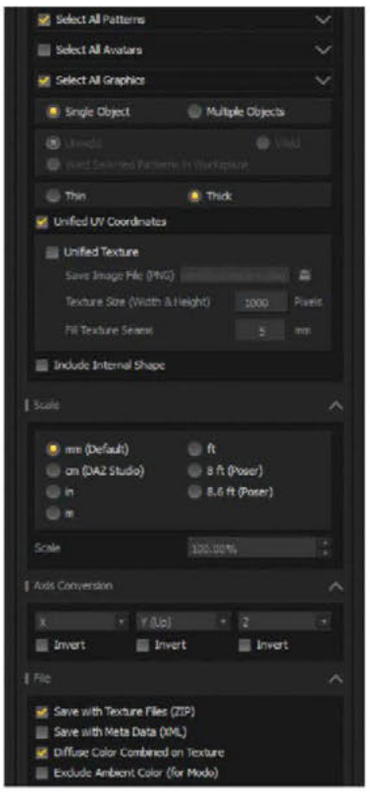
### Number for the correct order

If you wished to make additional clothing items to rest over the top of each other, such as a shirt under the jacket, a shirt tucked into trousers or a scarf on top, you must then apply layer numbers to the items for them to be correctly layered.

3. Choose Add from the Load Type options and then Load as Avatar (only 'Avatar' objects will interact with cloth simulation in MD). The bench will appear in position. Repeat this procedure, but this time search for the 'pose.obj' file (also exported in step 3). This time choose Open and Load as Morph Target. The avatar will morph into the new pose on the bench and the clothes will follow.

## 25 EXPORT CLOTHES

You can pull the fabrics around in the 3D view while simulate is active to adjust their position. Press spacebar to stop simulation once all the fabrics are hanging as you want. From the File menu, choose Export and give a name to the file such as 'clothes'. From the dialog box, un-tick Select all Avatars, tick Select all Graphics, tick Single Object, tick Thick, Save with Texture Files and Diffuse Color Combined on Texture. Check the Select All Avatars option has remained un-ticked (after clicking on Thick this can switch back to default) and export.



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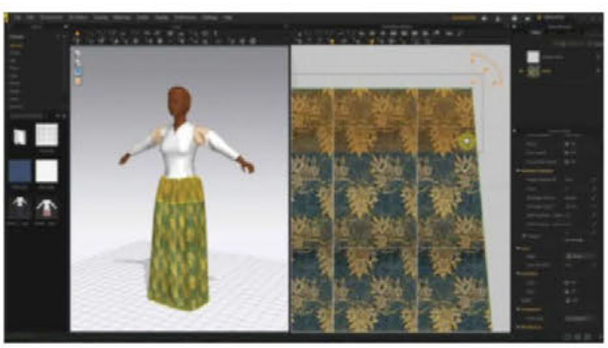
## 26 IMPORT INTO 3DS MAX

MD has created a zip file in the export process. Extract all the files from this and open the 3ds Max file 'pose.max' created in step 3. Import 'clothes.obj' into the 3ds Max file and the clothes will appear in place on our avatar. The material fabric scale has likely imported at a large scale. Open the Material Editor and select the Multi/Sub Object material that has imported with the obj clothes. Choose the material in the list and select the image map in the diffuse slot. Adjust the tiling size under Coordinates by multiplying by 10 in both the U & V slots.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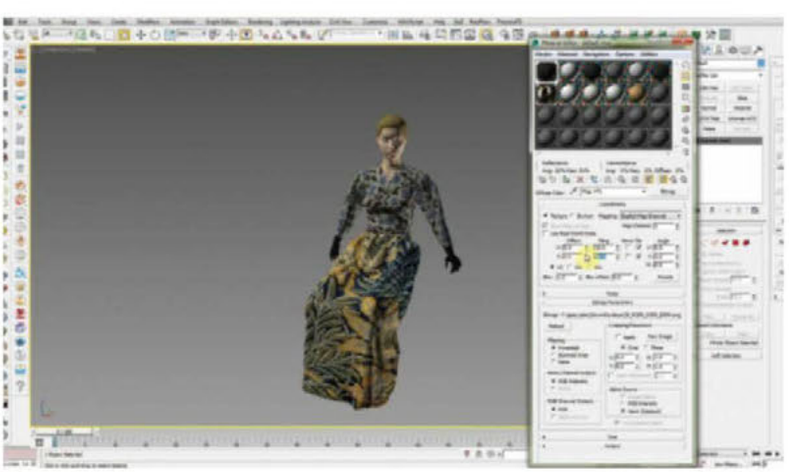
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FACIAL ANIMATION (OPPOSITE)
**By using the specialised tools in iClone7, it is possible to animate relatively easily.**

REALLUSION ICLONE 7 | REALLUSION FACIAL MOCAP PLUGIN

# CREATE PRO-LEVEL FACIAL ANIMATION IN iCLONE 7

**Mike Sherwood** describes how to get the best out of iClone's powerful new facial animation tools

AUTHOR

**Mike Sherwood**
Mike Sherwood (aka 3Dtest) has worked in CGI for over 20 years, with clients including broadcast, games and software companies. Specialising in character modelling and animation, he is currently assisting Reallusion with iClone development.
http://bit.ly/2w0VpK2

This tutorial will take you through the many tools and techniques available for facial animation in iClone 7 – including lipsync, keyframing, puppetry and mocap – as well as timeline editing. I'll also describe ways to mix the different techniques in order to improve workflow, as well as how to fix and refine animation at any point in the timeline.

Working purely in iClone 7 with a pre-built character creator model that has been additionally polished in Photoshop and Sculptris, the tutorial will apply to any iClone/CC characters, or any non-standard human characters that have been brought into iClone and correctly set up for facial expressions via 3DXchange.

When used right out of the box, iClone 7 provides users with a uniquely comprehensive toolset for facial animation that can be used on many levels – from the rapid 'blocking in' of expression keyframes, through to subtle face puppetry and motion capture.

Probably the most important thing to understand is that these techniques can be used separately or together, depending on the results you're aiming for. You can produce decent animation extremely quickly just by using one of the tools, or you can spend time combining different tools and refining the animation, right down to the nervous twitch of a character's lip or eyelid.

For more information about iClone and other Reallusion products, pay a visit to **www.reallusion.com**.

**DOWNLOAD YOUR RESOURCES**
For all the assets you need go to
www.bit.ly/vault-227-legend

## 01 UNDERSTAND THE TIMELINE

All facial expression animation is handled on the character's expression timeline. This has four tracks – a clip track at the top, then muscle, eye and head key frame tracks respectively. Select and drag clips or keys to move them, or select and right-click to edit. Check Loop or Speed on the timeline toolbar to loop, speed up or slow down a clip by dragging its right hand boundary.

## 02 EDIT EXPRESSION CLIPS

Adding keys or recording animation to an empty timeline creates a new expression clip. If you right-click on the clip you will have access to all of the usual edit functions, including Break, along with Flatten and Sample clip commands. Flatten embeds all visible keys into the current clip, so you can add more keys cleanly, while Sample generates keys on every frame. Break auto-samples, so for clarity I would recommend flattening immediately before or after breaking.

### Easy timeline animation

Use Alt key with the mouse wheel, or plus/minus keys to zoom in/out of the timeline. When refining lipsync, use the audio waveform for reference whilst precision editing

## 03 PERFECT AUTO LIPSYNC

Use Create Script on the Modify>Animation Panel for auto lipsync methods, which load audio and viseme keys into the viseme track. Keys can be moved, also edited via the right-click menu. Left-click on a key or a track to open the Lips Editor to replace or create a key, and to adjust strength. Select a range on the Lip Options track and right-click for global adjustments.

## 04 FAST FACE KEY EXPRESSIONS

The Face Key Expression Panel is a library of expressions. Use the top-right drop-down list for different sections. Build facial animations by scrubbing along the timeline and setting keys by double-clicking the desired expression. To establish expressions for naturalistic animation, set an expression key, set again further along the timeline before the next expression.

## 05 THE EXPRESSIVENESS SLIDER

Use this slider to make expressions more subtle. You can also set expressiveness keys by adjusting the slider between existing keys. This control is on all Face Key Panels and has a global effect, so if you've used expressiveness and want to set keys in the same timeline area without the current value affecting the new keys, flatten the expression clip before adding new keys.

## 06 REFINE WITH MUSCLE KEY

It is possible to build up complete facial expressions and animations using the Muscle Panel alone, but it's especially powerful when it comes to adjusting and refining existing expressions, as well as between keys. Single or multiple parts of the face, as well as head, eye and jaw rotation, can all be selected and manipulated simply by left-clicking, holding and then dragging the mouse in different directions from the black background area of the Feature Selection Panel.

## 07 DEFAULT KEY AND ZERO KEYS

The Muscle Panel Default Key button sets muscle, eye and head keys on the current frame to the default clip state. This will be neutral if the clip has no flattened or recorded animation. You can also set keys in the muscle, eye and head tracks simply by double-clicking in empty frames – use these to establish the current timeline state, eg before/after applying expression or rotation keys.

## 08 ACCESS ALL AREAS WITH MODIFY

The Modify Panel sliders give you access to all underlying morphs, in addition to jaw rotations used by the Expression and Muscle Panels. You can see the sliders in operation each time you play or scrub through a timeline with keys in place. Use the sliders to achieve precision fine-tuning of the existing keys, as well as between keys. This process is extremely useful for error correction. Remember that the Modify sliders also accept negative numeric values if needed.

## 09 FACE KEY WORKFLOW

You could build up an animation solely using Modify sliders, but this would take ages! It's far quicker and easier to start with blocking in expressions, then refine using Muscle keys and finally Modify sliders. If you find that the clip is becoming cluttered with keys, or expressiveness values are limiting what you want to do, simply flatten the clip and continue adding and editing keys as before.

### Control your work area

Drag the timeline start and finish markers to bracket work areas into manageable chunks, as well as to limit clip creation ranges to achieve more precise animation recording

## 10 FACE PUPPET – MOCAP YOUR MOUSE

Face Puppet enables you to drive facial animation using your mouse: its job is to translate the motion of the mouse into full or part-face expressions, or any combination of these, depending on what options you have selected. It's extremely important to remember to preview before recording, so that you get a feel not only of how far you need to go, but also in which direction, so you can ensure you get the animation you want. Use the Strength slider to increase or decrease the effect.

## 11 FACE PUPPET RECORDING

Press enter to record at half speed, but combine this with By Frame (click the Realtime button to toggle) on the play bar to go slower still for even more control. You can blend animation by recording over an existing clip with 'Blend data on next recording' checked – with this unchecked, it will overwrite the previous clip. You can blend or overwrite full or part face expression recordings.

## 12 FAST FULL FACE PROFILES

You can think of Full Face Profiles as the Face Puppet equivalent of Expression Keys, only dynamic. These profiles make it possible for you to create animations very quickly by simply moving the face into and out of the expressions you want at appropriate points on the timeline. There are many options available to you, from character-specific profiles to generic, universal profiles for emotions, with both lips closed (ideal for use during lipsync) and lips open options.

## 13 HEAD MOTION PUPPETRY

Character profiles have head motion active by default – toggle head turns and tilts on and off using the buttons in the top left of the Solo Feature Selection window. Use associated head motion for quick animation, eg previz, but keep it off for precise face puppetry and add head motion in a separate pass either via Face Puppet, Face Key and/or using Edit Motion Layer.

## 14 THE EYE HAVE IT

iClone's auto-blink function is ideal for previz but for control, turn this off on the character's main Modify Panel and create blinks yourself. Subtle tweaks of the eyelids, when associated with focused eye motion, can have dramatic effects even without using additional parts of the face. For eye motion without mocap, use Face Puppet or set a key to indicate a particular focal point, then set this again a little further along the timeline for establishment before changing eye rotation.

**Stop (and critics are good)**

It's easy to lose objectivity when animating, so take a break, get some feedback from others, and stay open to criticism: it's all about improving results for an audience!

## 15 REFINE WITH SOLO FEATURE

Use the Eraser to deselect the current profile, select a Solo Feature and you'll see thumbnail options below the selection head. These are profiles for different expression variations for the selected part. Use separately to drive an individual feature to refine an animation, or combine by selecting multiple features and profiles. Mix them with Full Face Profiles if you wish.

## 16 FACE PUPPET WORKFLOW

I generally think of Full Face Profiles as a broad brush, while Solo Features are for more delicate work, but there are no hard and fast rules. While you can block in whole sections of Full Face Profiles before refining with Solo Features, you can also work much more subtly from the start, for example, by doing a pass of eyebrow motion, then mouth, then eyes, etc.

## 17 WORK WITH PUPPET CLIPS

Recording a pass of Face Puppet generates a clip on the expression track in the same way expression keys create a clip. All clips can be moved, edited, looped or sped up/slowed down. When blending (Blend checkbox selected) Face Puppet passes, start at any point, and the new clip which is created will mix seamlessly with any existing clip already present in the same timeline area.

## 18 FACIAL MOTION CAPTURE

The new iClone 7 Facial Mocap plug-in opens the door to true facial motion capture from established third-party developers. Starting with Faceware camera-based technology, facial mocap gives instant results based on tracking the user's own facial expressions, making facial animation easier and more straightforward than ever. Mocap recording creates a clip on the expression track as usual, and can be blended with existing keys and/or puppet clips.

## 19 SET UP AND CALIBRATE

Even lighting and good camera setup are important for mocap – the user's head needs to be framed centrally and straight on as if taking a passport photo. Calibration matches your neutral expression with that of your character. You can use calibration to tweak animation results, eg make your eyebrows higher during calibration to make low brows character animation more effective, make your mouth smaller to increase wide mouth effects, etc.

## 20 MASKING AND SETTINGS

You can mask off parts using the Mask Select head for multi-pass animation: that way you can record just the eyes, mouth or head, or whatever combination you like, and use the Record Blending checkbox to choose whether to blend or overwrite the previous pass. Use Strength sliders to exaggerate or reduce the relative degrees of animation, as well as Smooth to reduce noise/jitters. For lipsync, you can record audio simultaneously by using the Audio Recording checkbox.

## 21 COMBINE THE TOOLS

You can mix iClone's facial animation approaches in any way, and in any order, but it makes sense to consider best workflow, especially lipsync. Adding lipsync later to an animation that already includes the lips or jaw opening can be tough to resolve. So if the animation includes speech, lipsync first, either by auto lipsync or during mocap, before moving on to use other tools.

## 22 EXAMPLE WORKFLOWS

Again, there are no rules, but possible workflows could be:

A) Auto lipsync (including manual viseme refinement) > face key expressions and/or face puppet full face blocking > face puppet solo feature and/or face key muscle/modify refinement.

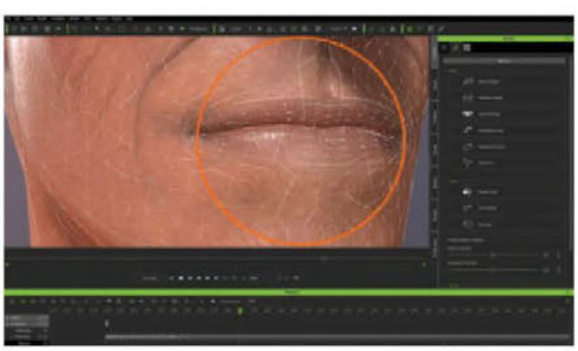
B) Facial mocap > if needed, blend in lip options filtered auto lipsync to audio recorded during mocap (particularly useful for adding tongue motion) > face puppet solo feature and/or face key muscle/modify refinement.

## 23 POLISH AND FIX

Once your animation is blocked-in, it may be time to stop if it's for previz. But if you're producing animation for production, it's time to start polishing. This is all about iteration – repeatedly playing and scrubbing through the timeline to check for areas which need improvement. Use Face Key Muscle and Modify for fine tuning, combined with timeline editing, for final animation fixing.

## 24 CLIP PROBLEM SOLVING

To reset/zero animation for all or part of a clip, use Face Puppet with Blend data… unchecked and record without mouse movement to zero individual features, eyes, head or all animation. Mocap with masking/zero strength recording and no blending does the same. To clear issues without reset, break and delete the problem clip area and either rework it, or simply use clip transitions to blend between the separated clips.



## 25 MODEL FOR ANIMATION

A character's face may look great when static, but could appear blocky with vertices bunching during animation, particularly at the mouth, eyelids and brows. This is due to modelling: for best animation results try to keep the facial mesh balanced, maintaining good vertex positions that relate well to the default morphing mesh for animation.

## 26 LESS IS MORE

Finally, with so many tools and possibilities available in iClone 7, it's all-too easy to overdo animation. So always try to keep your focus on what the character is communicating, and what's needed to clearly get that message across. Good animation can speak volumes with just a simple raising or lowering of an eyebrow, and over-the-top expressions are generally reserved for comedy and extreme situations. Please do bear these points in mind when creating animations. •

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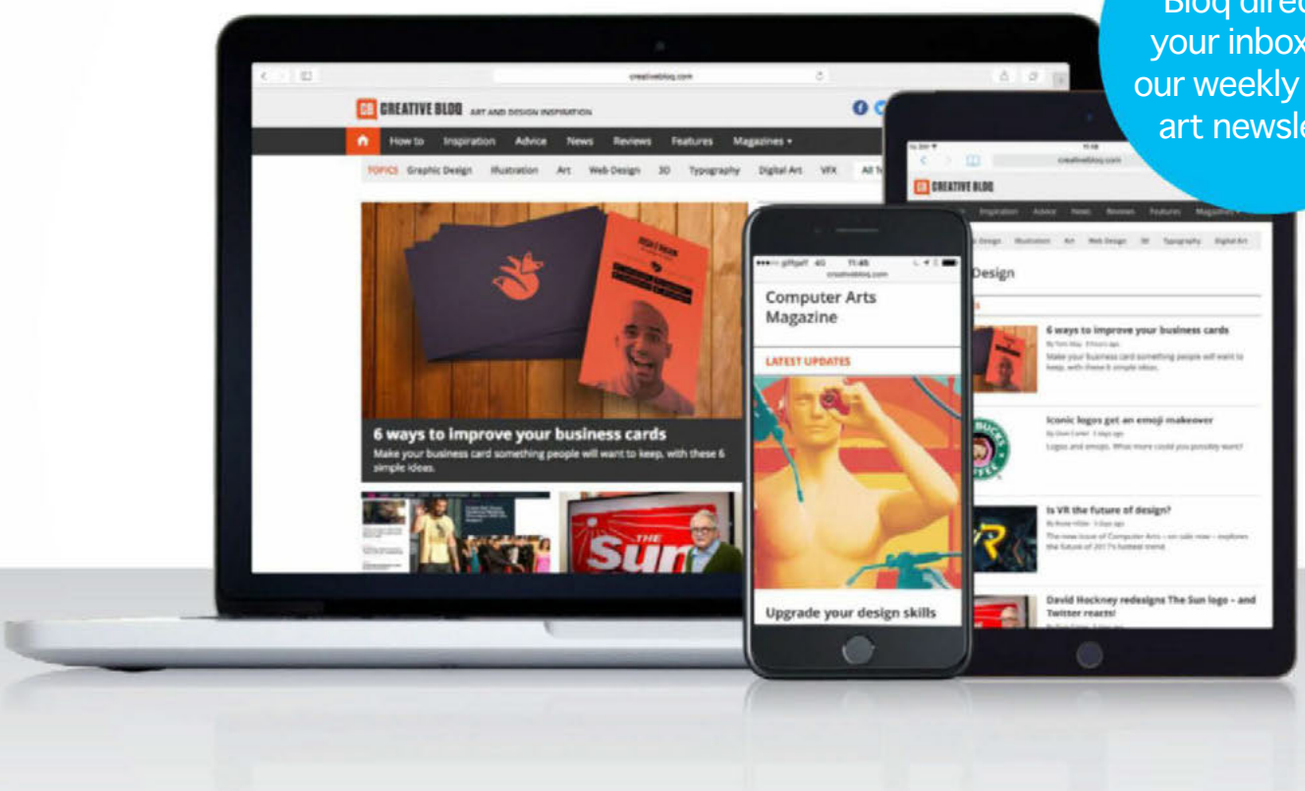


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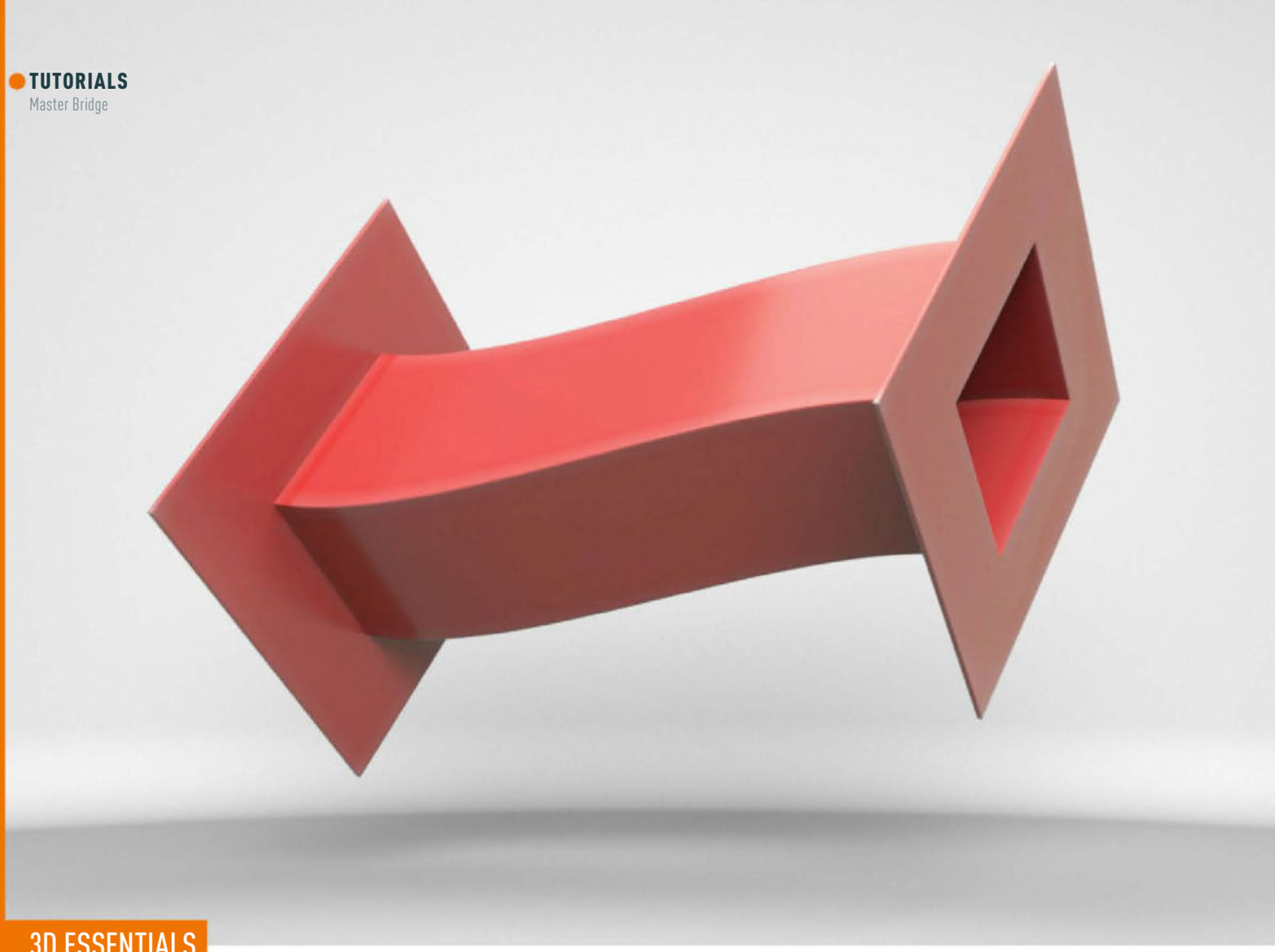

3D ESSENTIALS

# MASTER BRIDGE

## In our continuing series of CGI basics, we look at the Bridge function

If you're new to CGI there are far too many tools to choose from in a dizzying array of software. This series aims to break everything in CGI down to the very basics, so that every artist can be armed with the knowledge of which tool is best. This time we are looking at the Bridge function.

Bridge is one of the most helpful functions in a 3D artist's arsenal. It is a hugely versatile function that can create the foundations for a complex build, or create curved and twisted geometry all by itself with a single click of the mouse.

One of the key things that using Bridge teaches is the concept of surface normal direction on a polygon. While polygons (or faces) may appear to be a 3D shape, a polygon only has one 'true' side, and the normal denotes the perpendicular direction the polygon is facing. This matters when using the Bridge tool, as bridging two polygons facing the wrong direction can create unpredictable results, and make using the Bridge tool a disappointing experience for new users.

The Bridge tool has the power to radically change your geometry by removing polygons at the ends of bridge segments, so make sure you are aware of all the options that the Bridge tool has in each piece of 3D software.

These options can include factors such as twisting, and making a curved bridge, as opposed to a linear one.

Some apps can use the Bridge command to create polygons from vertices, which is a powerful way to remesh geometry. When working with meshes using Sub-division methods, like Open SubDiv, mastering the Bridge tool is a good way to get to grips with complex shapes. For example, creating a basic arm between a wrist and shoulder model.

Certain 3D applications can allow multiple elements to be bridged with one click, which enables complex and organic models to be created easily.

The Bridge tool is a versatile command that takes a lot of the pain out of 3D modelling.

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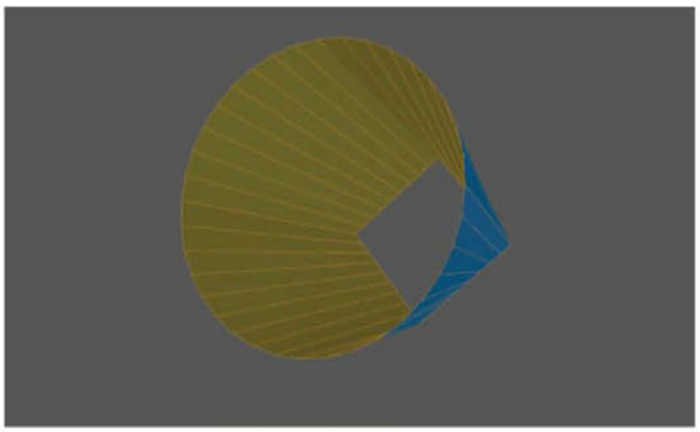
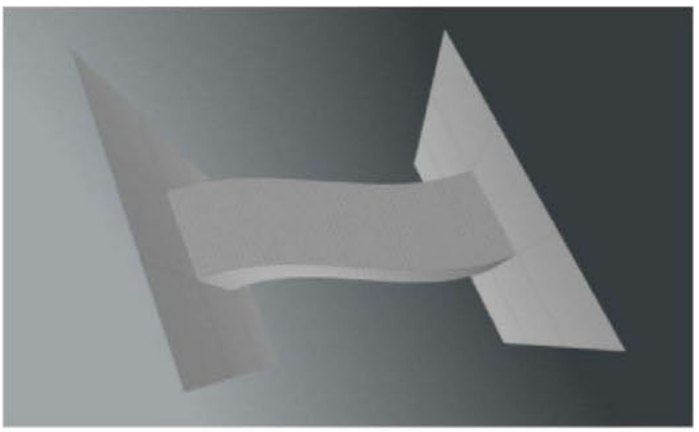


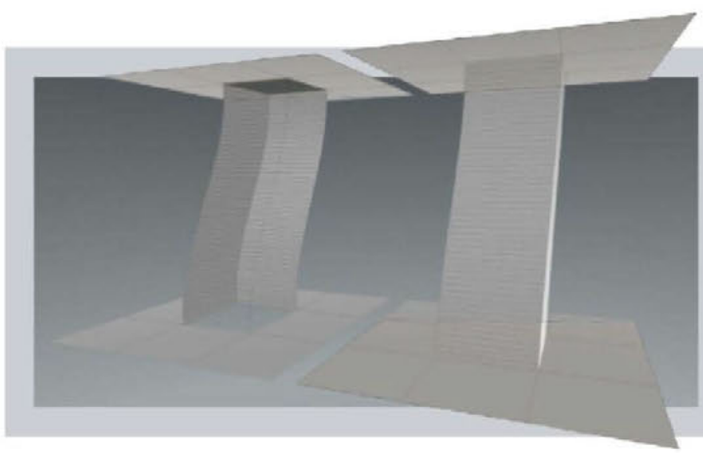


## 01 BASIC BRIDGING

At its simplest, the Bridge tool creates geometry between two selected and unconnected elements. These can be vertices, edges or polygons, ideally with the same edge count. Using Bridge with polygons to create a new length of geometry can remove the end polygons, creating a tunnel. Using the Bridge command with edges can be an excellent way to retopologise a scanned model into a mesh pattern, which works better for animation.

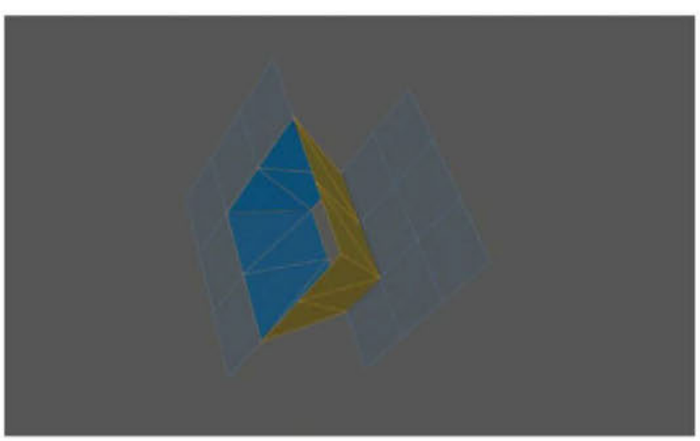
## 02 CURVED BRIDGES

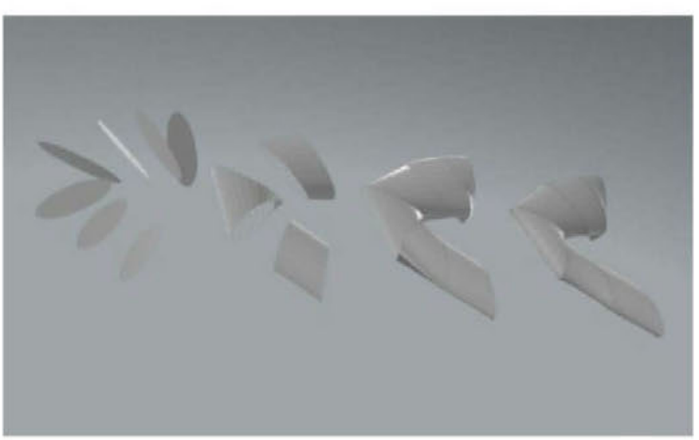
Most 3D applications enable the Bridge tool to create curved, rather than linear, connections. This can be a great way to make pipework, or more organic shapes quickly and easily. The applications which do allow curved bridges will also allow the number of divisions, otherwise known as edge loops, to be controlled. This means a curved bridge can be faceted or smooth. Having a faceted bridge is useful for hard modelling and game assets.



## NORMAL DIRECTION

One of the key lessons that using the Bridge command teaches is understanding the direction that surface normals face. Simply put, this is the way that the polygon is facing and getting it wrong can have big implications when using the Bridge tool. Some 3D software is more forgiving than others with normal direction, but if a bridge command is not connecting in the way that is expected, do not be surprised that normal direction is the culprit. Most 3D applications depict normal direction by not showing the back of a polygon, and many have the option to explicitly show the normal direction when a polygon is selected.



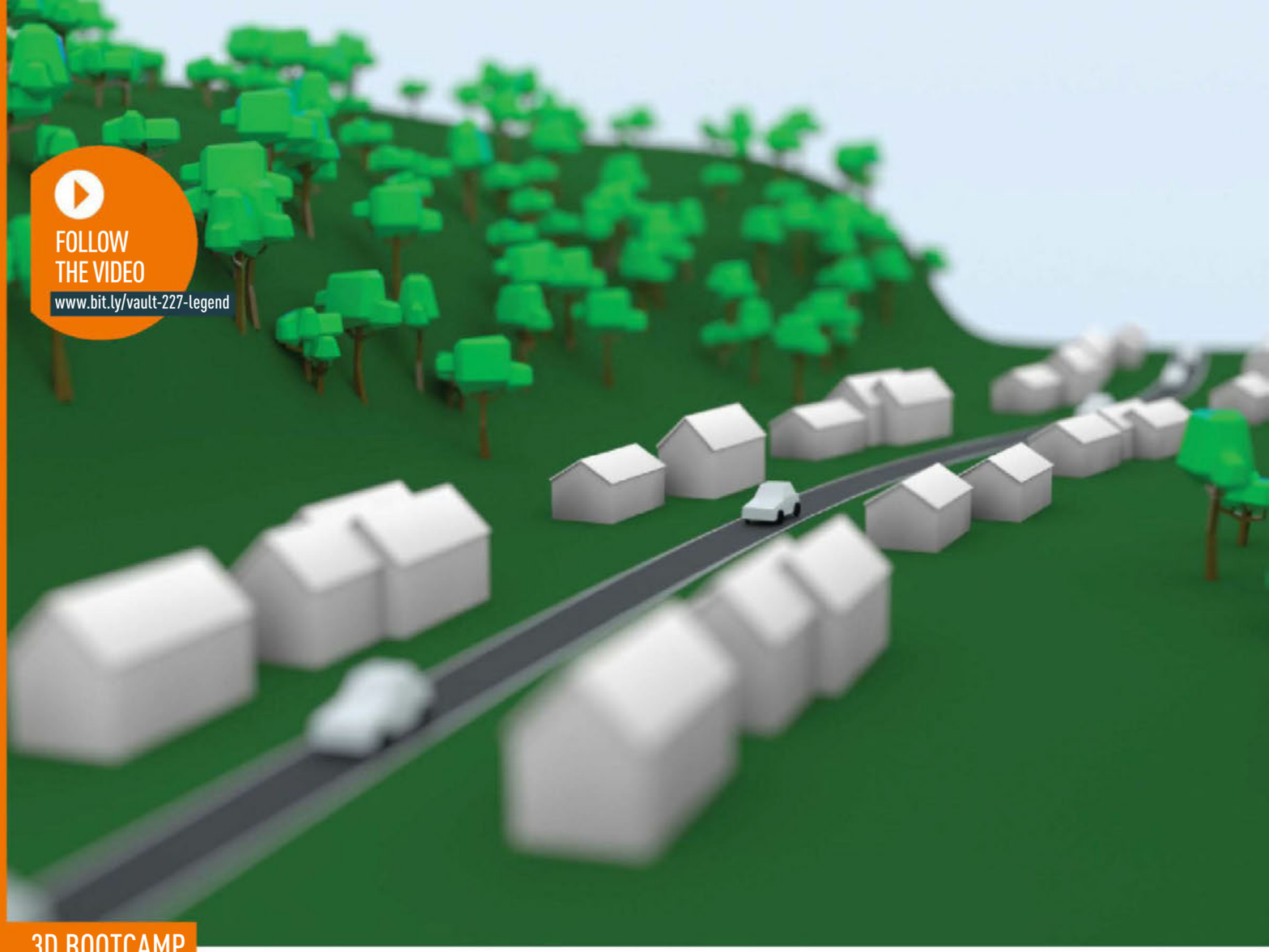


## 03 BRIDGE DIFFERENT ELEMENTS

Most Bridge tools are great for linking similar polygons or edges, and you'll find that this is the most common workflow. However, the Bridge tool can also be used to create geometry between radically different geometry. The catch is, however, that there can be some trial and error in finding which is the correct 'shape' that is desired. This is due to the fact that the algorithm bridging the geometry is making a best guess, and as a result there can be some tidying required.

## 04 MULTIPLE BRIDGES

Some 3D applications enable multiple elements to be bridged. This is a great way of creating really complex geometry based on a few simple polygons. If linking polygons to create organic shapes, using a tension or similar command can allow pinching at bridge segments, which can help give a much more natural appearance to geometry. Also available in some applications, when bridging multiple elements, is to skip every other bridge. This can create multiple pieces of geometry. •




3D BOOTCAMP

# MASH IN MAYA

## The MASH toolset in Maya is not just for creating motion graphics

MASH is the procedural modelling and animation toolset for Autodesk's Maya software. Developed by the UK's Mainframe (North) to help add motion graphic procedural tools to Maya, MASH went on to become an essential plug-in for many motion graphic artists using Maya in their workflow.

Autodesk saw the potential of MASH and bought the plug-in. In the past few Maya releases, MASH has become an increasingly integrated tool within the core Maya offering.

MASH offers a range of tools to make any 3D artist drool, with procedural modelling, animation tools and texturing all available within a couple of clicks.

One of the biggest additions to MASH since its integration into Maya is the MASH editor. We'll admit, it's a touch peculiar to get excited about a panel, however the MASH Editor enables easy viewing and managing of a MASH 'network', which is the term given to a MASH object and its component parts. However, the most important aspect of the MASH editor is that it enables re-organisation of a MASH network, which can have powerful implications on how a MASH network performs, but all with an easy-to-use and logical interface.

The team behind MASH are adding increasingly powerful nodes to the tool, which makes the most of Maya's inherent viewport speed and MASH's underlying technology. One of the most exciting new nodes is the 'World node'. This creates a replication ecosystem based on natural growth systems and can create everything from a time-lapse of a city growing to unique clumps of geometry to be used in a 3D UI animation.

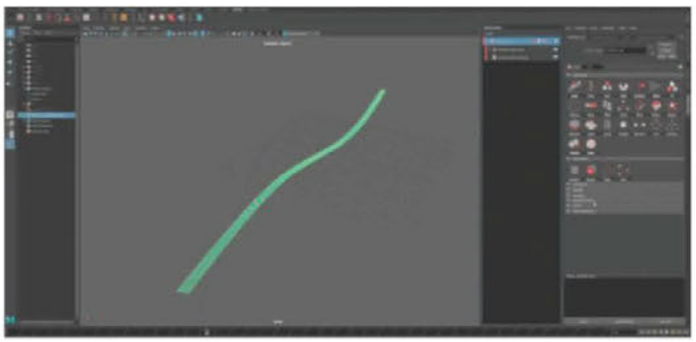
Because MASH is a procedural system, it is possible to change any element throughout a MASH network, from animation speed to the base mesh itself. This means that setting up default networks to share among other artists is incredibly straightforward, and also means that MASH is an excellent place to start for new Maya artists.

AUTHOR

**Mike Griggs**

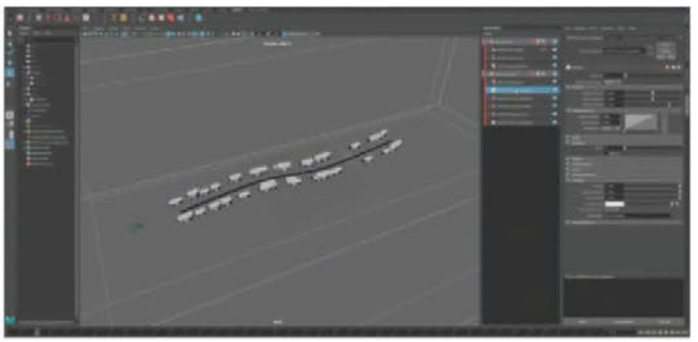
Mike Griggs is a 3D and visual effects artist with vast experience across the industry, as both a creator and a technical writer.

www.creativebloke.com



## 01 THE MASH REPROMESH

MASH can accept most geometry types created in Maya. When geometry is added to a new MASH network, a piece of geometry is created (MASH Repromesh). This shows the results of actions within the MASH network. The original geometry is hidden when added to the network, but can be edited, with any changes to the source geometry updated into the Repromesh. Repromeshes can be used as the source geometry for a MASH network.

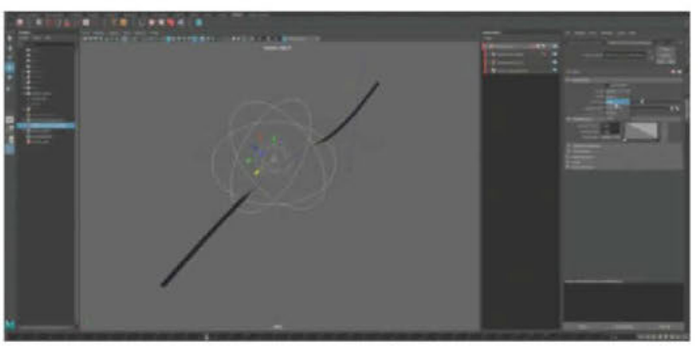


## 02 WORK WITH THE MASH EDITOR

Once a MASH network has been created, access the MASH editor. It acts as a visual aid for seeing which nodes have been added to a MASH network. It can also act as a tool in its own right, as MASH nodes can be re-ordered, which can have profound changes to the MASH network. For example, with the houses, putting an ID node after a Replicator node creates random instances across an entire MASH network rather than on the source of the Replicator.

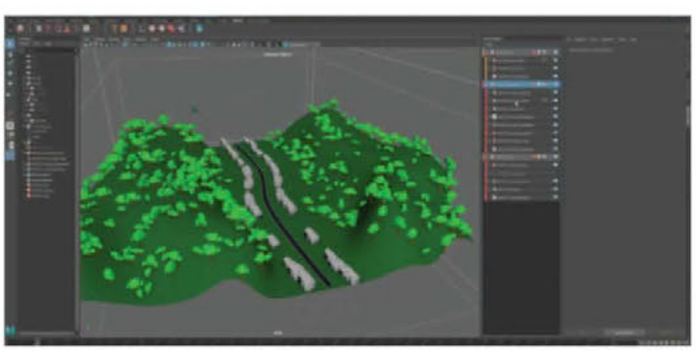
## 03 HELPER GEOMETRY

Geometry can be useful for creating MASH networks and manipulating them afterwards. The road, houses and cars in the demo scene were all originated from the same curve. Use the Curve node to create static geometry when its animation speed is set to zero on the house. Repromeshes can't be moved unless a Transform node is applied; these can then have helper geometry applied in order to act as controllers.



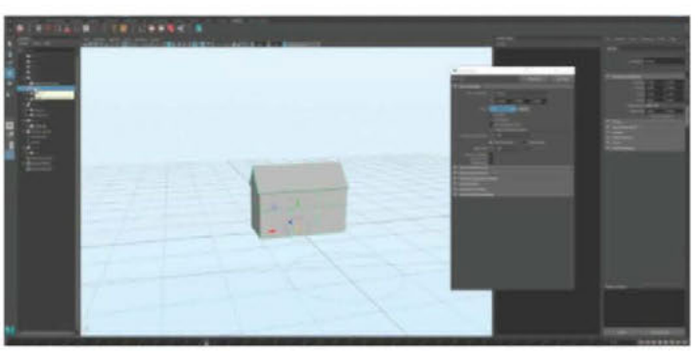
## 04 ANIMATE WITH FALLOFFS

Animating procedurally within MASH is easy when Falloffs are created and coupled with nodes. To have a Repromesh appear, use an Offset node to create a MASH Falloff. This is an object that can be animated to activate the elements within a MASH network. A mesh can be paired to a MASH Falloff to create complex interactions. Multiple MASH networks can use the same falloff, which can be a good way of synchronising animations across a scene.



## 05 SPREAD GEOMETRY OVER A MESH

MASH networks offer multiple methods of spreading the source geometry across a landscape. The easiest method is to use the 'mesh' option in the Distribute node. Recently the Placer and World nodes have been added to MASH. The Placer node lets artists paint where they want the geometry to be applied, and the World node spreads geometry using a variety of scientific methods. It is a great way of creating time-lapse animation of systems growing.

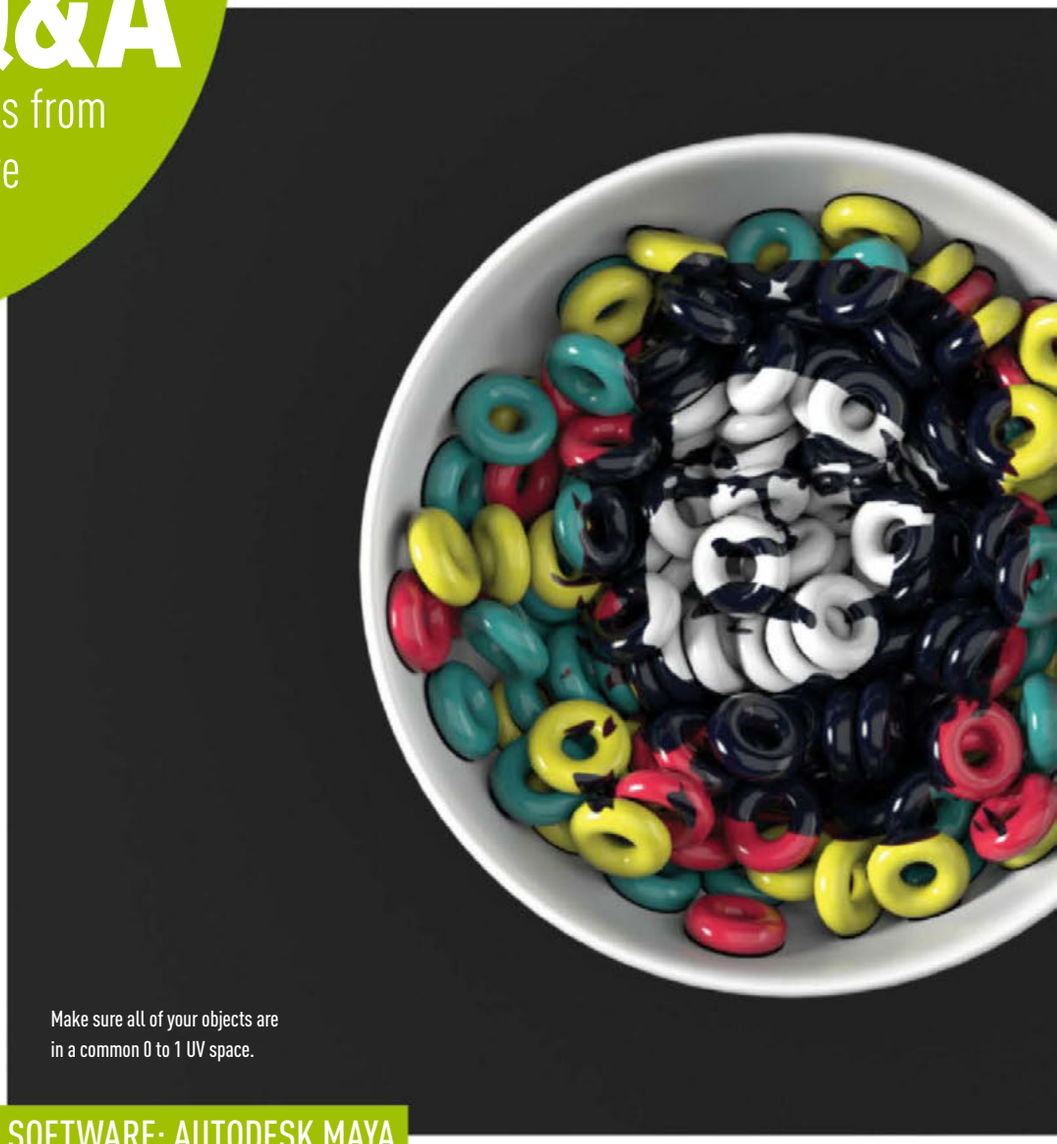


## 06 PEFECTING PIVOTS

The Pivot point of a MASH source mesh is hugely important when creating MASH networks, because MASH places and animates from the Pivot point. Move the pivot to the correct position for an object, for example to the bottom of a house which needs to be placed to the ground. If the pivot position isn't working as expected, make sure to use the Bake Pivot command. Using a group with the geometry within it can be another great way of managing pivots. •

# ARTIST Q&A

Practical tips and tutorials from pro artists to improve your CG skills



Make sure all of your objects are in a common 0 to 1 UV space.


**Syawish A Rehman**
A motion graphics and VFX artist from Pakistan with nine years' experience, Syawish loves motion graphics and making video tutorials.
www.bit.ly/syawish

**Maya Jermy**
Maya is a 3D artist and animator based in the UK. She started her career five years ago remaking and animating characters for *Oddworld: Abe's Oddysee – New 'n' Tasty.*
www.mayajermy.com

**Paul Hatton**
Paul leads a studio of visualisers based in the UK. He delivers a host of projects including video and interactive environments.
www.cadesignservices.co.uk

**Antony Ward**
Since the early 90's Antony has worked for many of today's top game and VFX studios, as well as written three technical manuals and many online tutorials.
www.antcgi.com


## GET IN TOUCH

EMAIL YOUR QUESTIONS TO
rob.redman@futurenet.com

SOFTWARE: AUTODESK MAYA

# HOW DO I BAKE TEXTURES ON DYNAMICALLY SIMULATED PARTICLES?

*Jeffrey Glade, London*

**Syawish A Rehman replies**

First things first, I know this has been covered by Greyscalegorilla for Cinema 4D but not Maya, so that's what we'll concentrate on. In Maya, this is much more difficult than C4D because C4D is built for motion graphics, so uses instancing geometry, which is a bit of work in Maya.

The first thing you do is create a geometry. I'm going be using a simple torus for this. To make copies of that, simply duplicate it; don't over-complicate things with stuff like particles. You CAN use particles but I would advise against it because they're a bit difficult to texture properly since their UVs are a little off and also, they're difficult to render with V-Ray. So create a torus, then make about 400 copies of it, vertically stacked.

We have to remember something really important. Make sure all of your objects are in a common 0 to 1 UV space. I'll talk more about this in the following steps. A simple method for this type of object would be to combine them into one object and unfold the UVs. That way all of your objects will share a 0 to 1 UV space. Then, simply separate them into objects and

you'll have all your objects separate, but in a common UV space. Be sure to keep some distance between the bowl (or whatever they're going fall on), otherwise the simulation looks weird because they all fall in an unnatural way.

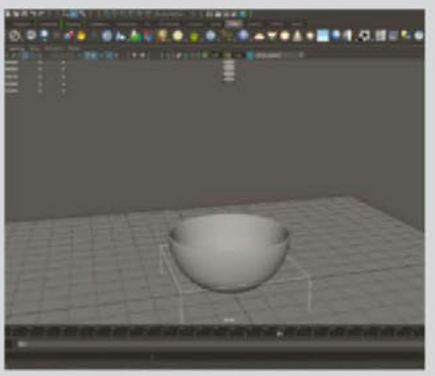
We're going to be using Bullet Physics engine for this because Maya's legacy engine doesn't work well with a large number of objects. So, select the torus (or whatever your particle of choice is) and set to Dynamic Bodies or Active Rigid Bodies, whatever the terminology is, in your Physics engine. Make sure that, if you're using Bullet, you put it into a set of Rigid Bodies. That way, you'll have the torus become one object, which is easier to deal with. Then, we'll set the bowl to Static Body or Passive Rigid Body. Run the simulation and you'll see where each torus falls. Once you've run the simulation, cache it to make sure it doesn't change after multiple simulations. Then it's on to texturing, where we're going to project the texture on top of our objects.

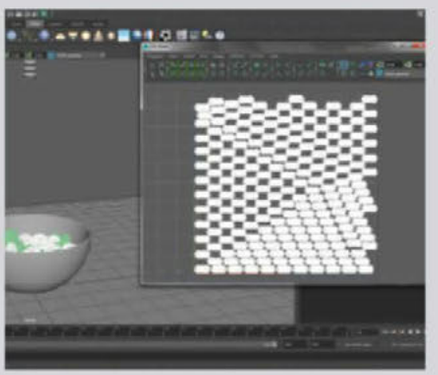
## EXPERT TIP

### WHY NOT PARTICLES?

It's best to avoid using particles instead of physical geometry because they have a weird UV system. This means that it never seems to quite work the way you want it to. Also, you might end up with as many maps as the particles themselves, which isn't good at all.

## STEP BY STEP BAKE TEXTURES ON PARTICLES



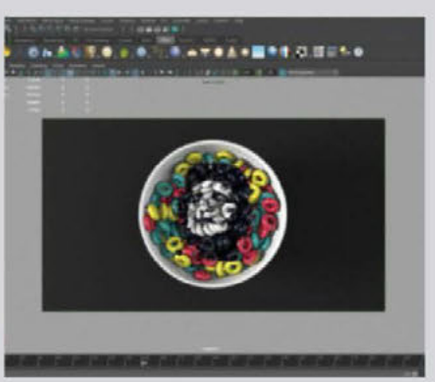


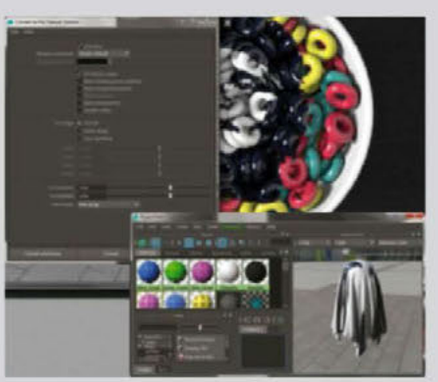
### 01 GENERATING PARTICLES

Go to the Polygon shelf and then create a sphere. Select the top half of its faces and delete them. Now press Ctrl/Cmd+E and extrude it out however you like, to create a bowl. Create a torus from the Polygon shelf and set it as you prefer. Find a balance, make it small to look realistic but not too small, otherwise you'll require a lot more of them to fill the bowl and that's gonna suck!

### 02 UNFOLDING UVS

Select the torus and duplicate to create 100 copies. Select them all, go to the Modelling menu set>Mesh>Combine to combine all of your torus copies. Now go to the UV menu and open UV Editor. Select all the Polygons there and under the Polygons menu, click Unfold. This will Unfold all the torus copies into a single shared 0 to 1 UV space. This is a very important step – do not mess this up.





### 03 PROJECTING TEXTURE

Create a shader for the torus objects. Give it a diffuse map. Once the menu opens for you to choose your map, right-click the File button. You'll see an option for Create a Projection. In that, add the diffuse texture you want to use. Now you'll get projection nodes that will project the texture on the geometry. Create a new camera and parent the node to that. Manipulate the camera to taste.

### 04 BAKING TEXTURES

Go to the Hypershade, select the Material as well as the mesh, go into the Edit menu bar and click Convert to File Texture. This turns your projection image into a usable separate material and distorts it to your UVs, rather than distorting the UVs to fit your projection, which would throw out everything we have done up to this point. The new file generated can now be used as a texture.

SOFTWARE: ZBRUSH

# HOW DO I MAKE REALISTIC HUMAN EYES IN ZBRUSH?

*Charlie Pope, San Francisco*

**Maya Jermy replies**

As an artist, I know how important it is to have a library full of assets ready to be used in any project I get to work on. It helps a lot when the schedule is tight and with a deadline approaching, all you want to do is focus that precious time and energy on more bespoke parts of the project. Whenever I find myself between client projects, I like to update and expand my library of assets, and this time I am focusing on sculpting a realistic human eye.

No two eyes are exactly the same, so unless you have something very specific in mind, it does not matter how perfectly you copy the reference material. As long as you understand the anatomy and get the general shape right to allow the light to do its job, you can create just about anything.

Let's simplify our organ of sight into four areas: cornea, iris, pupil and sclera. A real human eye contains a lot more than this, but we are going to focus on the four visible areas because that is all we need to make it believable. Nonetheless, it is worth knowing how the real thing is built and how all the little components work together in order to enable us to see.

The cornea is the dome-shaped clear front surface of the eye, which works like a camera lens to focus light. The iris is the pigmented circular structure that controls how much light enters the eye by automatically adjusting the size of the pupil with two muscles: the sphincter pupillae to narrow the pupil, and the dilator pupillae to widen it. We will build the iris as one object with pupil and sclera, the white part of the eye. The pupil (which is like a camera aperture) is the black hole in the iris, and contracts when it's exposed to bright light, and expands in the dark,

As long as you understand the anatomy and get the general shape right to allow the light to do its job, you can create just about anything.

allowing more light into the eye to help you see.

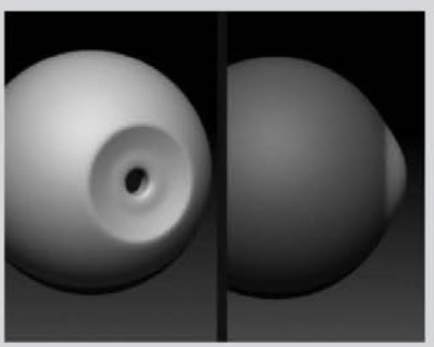
To start off, we will create two spheres. Let's name the first one Sclera, and its duplicate Cornea. Scale up the Cornea a tiny bit so it wraps around the Sclera. Make sure that the Cornea sphere is not so big it casts shadows on the Sclera, but big enough not to intersect. With the base prepared, you are ready to sculpt. Before you jump into ZBrush, look at reference images of human eyes; you will see how different they all are. Decide which pattern you like most and follow the steps.

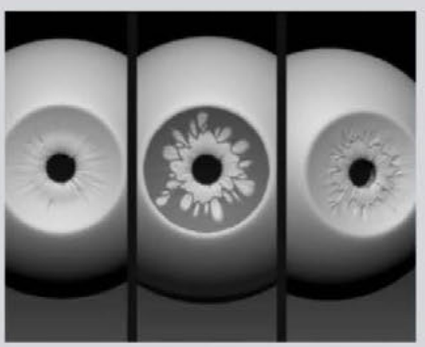
**EXPERT TIP**

### SAVE YOUR TIME WITH ALPHAS

Painting veins by hand can take a lot of time, so if you are in a hurry and want to speed things up, you can download ready-made alpha maps from Pixologic's download centre, or make your own in Photoshop.

## STEP BY STEP MAKE A REALISTIC EYE



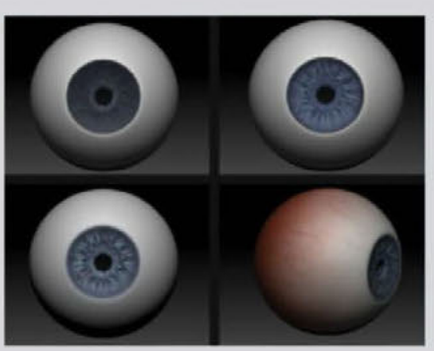


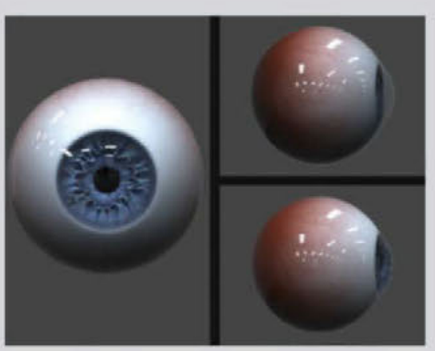
### 01 MODELLING THE CORNEA AND THE IRIS

Select the Sclera, mask out the iris and push it in with the Move tool, creating an inverse dome. Mask out the pupil, remove those polygons and extend the edges towards the centre of the eye. Unhide the Cornea, mask the same area as for the iris and push it out, making a smooth dome.

### 02 SCULPT THE IRIS

Using Standard and Dam Standard brushes, begin sculpting fibres from the pupil towards the outer edge of the iris. The aim is to make them resemble a muscle. Mask out a pattern with the radial symmetry, then edit it according to how you want it to look. Pull out the shape and then smooth it out a little.





### 03 PAINT THE EYE

With the base structure sorted, it's time to add some colour and finer detail. Use mask by cavity to add extra depth when painting the iris. Draw more colourful fibres and blend them out around the edge of the iris. To add veins, cover most of the white with a red mist, and then drag out vein alphas.

### 04 FINAL TOUCHES

Export the eye model to KeyShot. Apply glass material to the cornea and enable two-sided refractions. No refractions would make it look as though there was an empty space between the iris and the cornea. If needed, go back to ZBrush and tweak the eye until you reach the desired look.

SOFTWARE: SUBSTANCE DESIGNER

# HOW DO I ADD AMBIENT OCCLUSION IN SUBSTANCE DESIGNER?

*Rachel Harrison, Edinburgh*

**Paul Hatton replies**

Ambient Occlusion (AO) is essential for pretty much every model that you will texture. Its application for creating fine shadows, surface wear and tear or even dust makes it a very handy texture. Every renderer will provide you with a map that simulates it and Substance Designer is no different.

Quite recently Substance Designer made some pretty impressive improvements to its AO map, so I'll run through how to do this from version 5.6. Prior to this new AO node, you had to bake your AO map from your 3D mesh. This wasn't necessarily a major problem but it did require an extra step and therefore added extra time to your workflow. In version 5.6, though, Substance Designer decided to completely overhaul the node and give us a new one! It's called the HBAO node, which stands for Horizon Based Ambient Occlusion. It's still based on a height map but compared to the previous raytraced option, it delivers exceptional results in a fraction of the time. Thank you Substance!

To get the node up and running you will need to create a bitmap node (containing your height map), and connect it to your Ambient Occlusion node. With the AO node selected, you'll gain access to all of the node's parameters. Let's take a look at the Instance Parameters rollout briefly. Firstly, it gives you the option to Use World Units. If you click where it says False, then it'll enable you to specify the units you want to use. Following that, you can set the Height Depth you require. The Radius parameter now behaves in a much more natural way, which is good to hear.

Finally, there is the option for GPU Optimization. If you want to use this you will need to make sure that the Rendering Engine is set to your GPU, rather than your CPU. Plugging your AO node into a base material will then give you something that is usable.

It's really that simple! Please note that you can give the AO node any bitmap data, enabling you to customise exactly what your AO is going to look like.

**EXPERT TIP**

**HDR IMAGE INPUTS**

The AO node can now take both 16-bit floating and 32-bit floating image input. This means the height map input can contain a huge dynamic range of information, resulting in an even more detailed AO map. Obviously you'll need to be aware that the more data you throw at it, the longer it'll take to compute.

SOFTWARE: AUTODESK MAYA

# HOW DO I ADD MORE FLEXIBILITY INTO MY RIGS?

*Dave Pearson, Rotherham*

**Antony Ward replies**

When it comes to rigging in Maya, it's never a case of one size fits all. Each technical artist will have their own techniques, which makes each rig unique to them. With that said, there are foundation techniques that everyone will use at one time or another to adapt and build upon to create a rig to suit their particular needs.

One of these techniques, which has been around for a while now, is known as the ribbon rig.

Broken down to the bare bones, this rig essentially puts control of the joints in the hands of a NURBS plane. You then deform the plane how you want and the joints follow. The beauty of this type of approach is its flexibility in that you can move the CVs around to deform the plane, giving you the opportunity to make all sorts of weird and wonderful shapes. Perfect for a cartoon character whose arms need to twist, bend and wiggle.

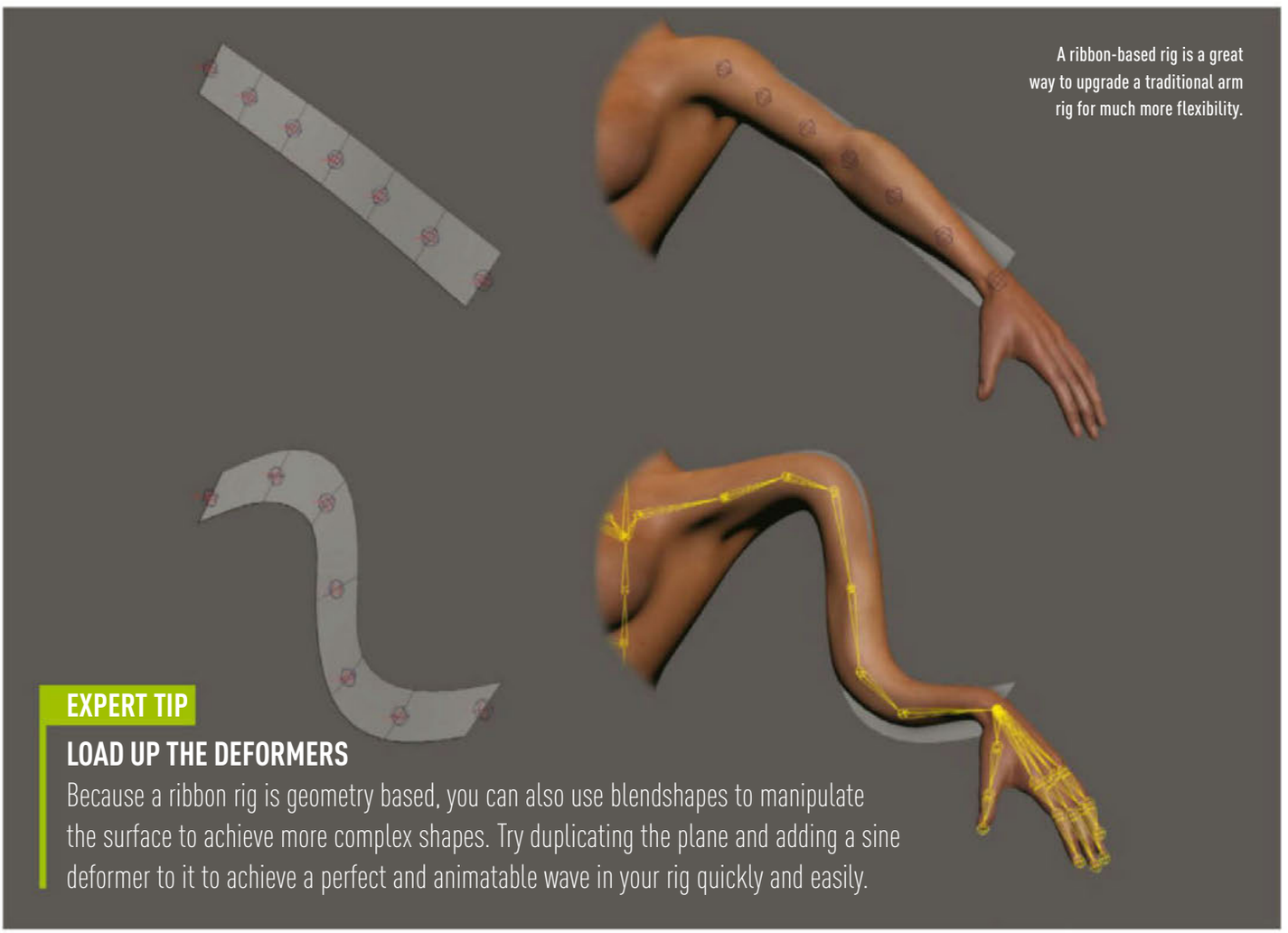
So how does it work? Well, attached to the NURBS plane are a series of follicles that follow the surface as it deforms, maintaining the correct orientation and position relative to the surface normals.

These follicles are the key to the whole system because you can parent your bind joints (which drive your character's mesh) to them, meaning when the NURBS plane is deformed the follicles move, and where they move, the joints follow.

For example, let's say that you're building a rig for an arm. The ribbon would have maybe seven joints, one for each key pivot point, (shoulder, elbow and wrist), with two extra joints between these for twisting and deformation.

With the ribbon as your foundation you can then start to build the beginnings of a control rig to manipulate it. However, rather than editing the bind joints directly, you would use a skinCluster to pull the NURBs plane around, as this is already in control of the joints.

It sounds complicated but it's straightforward when put into practice, and the beauty of this approach is it's also ideal for facial rigs.



A ribbon-based rig is a great way to upgrade a traditional arm rig for much more flexibility.

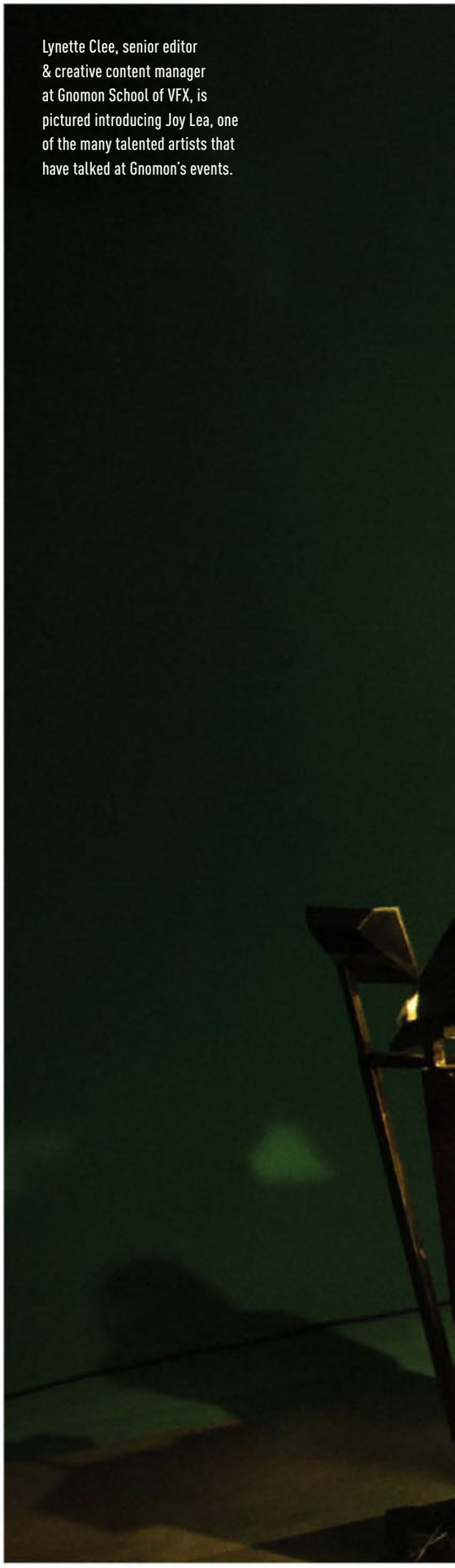
**EXPERT TIP**

**LOAD UP THE DEFORMERS**

Because a ribbon rig is geometry based, you can also use blendshapes to manipulate the surface to achieve more complex shapes. Try duplicating the plane and adding a sine deformer to it to achieve a perfect and animatable wave in your rig quickly and easily.

# INSIGHT

News and views from around the international CG community



Lynette Clee, senior editor & creative content manager at Gnomon School of VFX, is pictured introducing Joy Lea, one of the many talented artists that have talked at Gnomon's events.

INDUSTRY INSIGHT

# FREE EVENTS FOR ALL ARTISTS

Giving back to the community: Gnomon School's events create opportunities for artists everywhere to grow their skillsets – for free!

When we hear the word 'Gnomon', we will most likely immediately think: 'Education'. Whether this association comes to us from the internationally famed, award-winning school in Hollywood, or from our trust of the online training platform from Gnomon School's sister company, The Gnomon Workshop, the common factor is industry-leading instruction.

## SERVING HOLLYWOOD AND BEYOND

Hailed as "the MIT of visual effects" by *Fast Company* magazine, Gnomon School of Visual Effects offers an unrivalled experience for students looking to work in films and games, and boasts a 2016 employment rate of 100% and 93% for its vocational programmes. Add to this a new BFA degree in Digital Production that launched this year, and it's clear to see that Gnomon School is stepping up its game and taking impressive strides to educate the next generation of digital artists with even greater opportunities than ever before.

While studying in Hollywood may not be feasible for everyone, one of the things that makes Gnomon School different is its efforts to build and maintain a global community through an exceptional programme of Gnomon events that are available to everyone – for free! For those local to the school's campus, they can meet superstars from studios like Walt Disney Animation, Riot Games, Industrial Light and Magic, as well as art legends like *Star Wars'* Iain McCaig, *Stranger Things'* Aaron Sims, and ILM's Paul Giacoppo. What's more: almost all Gnomon events are streamed live through Gnomon's Livestream channel, and archived for future enjoyment. Again: this is free. Head to **livestream.com/gnomon** to check out the full collection of past events and see what's coming up next.

## POWER IN NUMBERS

From making-of features showcasing the latest VFX techniques of blockbuster films and video games, to inspiring panel discussions with award-winning artists, Gnomon events have grown over the last couple of years to a rate of at least two free public events per month – and sometimes four or more. In 2016, Gnomon's senior editor and creative content manager, Lynette Clee, produced – leading a fearless events team – more than 30 events throughout the year, with around 2,460 attendees visiting the Gnomon campus within 12 months to watch the free events in person. Additionally, Gnomon logged that events were viewed by over 183,500 unique viewers on Livestream last year, with online watchers tuning in from all corners of the globe. This impressive feat was the handiwork of Lynette, who before working at Gnomon School spent nine years serving ›


## JOIN THE COMMUNITY

Gnomon events offer priceless education, information, and inspiration for artists of all specialties and calibre – and best of all: it's free! If you're lucky enough to live in Los Angeles, check Gnomon's event calendar at **gnomon.edu/events**. For the rest of us around the world, we can simply tune in at **livestream.com/gnomon** to catch all the action. To make sure you never miss out: sign up to the mailing list at **gnomon.edu/enews**.


the digital art community through her roles for 3dtotal.com, 3dtotal Publishing, and *3D Artist* magazine.

Lynette told us: "We've built a fantastic following through our events; we've worked with artists from many of the biggest studios in LA and beyond, and we've been honoured to host several Oscar and Emmy Award winners at the Gnomon stage this year alone. We love meeting new artists from the local community every month – and by streaming our events on Livestream, we can also communicate with viewers all around the world, even while we're producing the events live. Being able to extend our stage – which accommodates around 250 attendees – to literally thousands of people across the globe, adds to the excitement and energy for the audience and speakers alike."

"BEING ABLE TO EXTEND OUR STAGE... TO LITERALLY THOUSANDS OF PEOPLE ACROSS THE GLOBE ADDS TO THE EXCITEMENT"

**Lynette Clee, senior editor and creative content manager, Gnomon School**

The Livestream team have been impressed by Gnomon's efforts, too: "From in-depth panels to artist workshops, Gnomon [provides] exclusive, high-quality content to their students, faculty, and viewers around the world," said Carly Walsh, content and social media manager at Livestream. "Gnomon makes it possible for anyone interested in computer graphics to learn from their favourite artists on their phone, computer, tablet, or smart TV apps."

As further testament to Gnomon School's event success of late, technology giant Lenovo joined forces with Gnomon this year as an event sponsor. Lynette explains: "In 2016, we helped companies like Allegorithmic, NVIDIA, Foundry, Chaos Group, FormLabs, and Pixologic host cutting-edge events at Gnomon, and so we were thrilled when Lenovo came on board as an official sponsor this year; we have such a talented and technology-hungry audience, which makes the partnership a great fit, and it's obviously a huge honour and compliment for us to have the support of such a well-respected company."

## KEEPING IT REAL

One of the keys behind Gnomon's event success is the eclectic mix of artists and topics that Lynette curates to reach artists of all genres, interests, and skill levels. In fact, Gnomon's event archive reads like a who's who of the film, game, and TV industries! From *Game of Thrones'* five-time Emmy Award VFX Producer, Steve Kullback, to Blur Studio owner and *Deadpool* director, Tim Miller, and dozens of game artists from the award-winning

Opposite top: With Gnomon School based in the heart of Hollywood, studios like Aaron Sims Creative – who worked on the Netflix series, *Stranger Things* – are close by for awe-inspiring making-of events.

Opposite bottom left: Where else can you find live animals, live sketching, a live audience, and live streaming? Gnomon events brings experts from a variety of industries to talk alongside artists.

Opposite bottom right: As well as bringing top studios to talk at the events, Gnomon School founder, Alex Alvarez, and other Gnomon instructors regularly take to the stage to offer free, in-depth workshops.

Below: On top of workshops and making-of events, regular discussion panels with award-winning artists make for great industry insights that you'll rarely find elsewhere of the same quality.

Naughty Dog studio, events have spanned the making of *Uncharted 4* and *Zootopia*, as well as live demos by artists that worked on *Wonder Woman* and *Star Trek Beyond*, and discussions with *Spider-Man* video game leads and *Kubo and the Two Strings'* VES Award winners.

A highlight of the Gnomon event calendar has to be the Anatomy Lab series. This year's Anatomy Lab: Stylized Creature Design Workshop event brought five talented illustrators and 3D artists to the stage for an assembly of live sketching, Photoshop, and ZBrush demonstrations, and offered attendees the chance to meet and sketch Boxer the serval between sessions. What's extra special about these anatomy events is that they always surprise by thinking outside of the box, bringing together experts in taxidermy and specialists from the Natural History Museum alongside professional animal handlers and digital artists to help attendees truly grasp the importance of anatomy in their art. We can't think of any other similar free community events that compare to this.

## A LITTLE EXTRA

While Gnomon School produces these events for the community at large, it's the students at the campus in Hollywood that benefit the greatest. Lynette says: "Whenever possible, if we get the chance to bring rock stars from the likes of Disney, ILM, Blur Studio, and Blizzard Entertainment, we always, always try our best to coordinate one-on-one time with our upcoming graduates and the visiting artists; this gives students a chance to get industry insights beyond those given at the event – and more importantly the chance to get portfolio reviews by industry legends!"

While studying at Gnomon may remain a dream for most of us, we're going to continue tuning in to the Livestream events; Gnomon School has very gracefully allowed us all to be a part of its community, and we can't wait to see what's coming next. •

## ZBRUSH SUMMIT 2017

**DID YOU KNOW: PIXOLOGIC HOSTS THE ZBRUSH SUMMIT AT THE GNOMON SCHOOL CAMPUS EVERY YEAR?**

It's true! For several years now, Pixologic has been hosting the wildly popular ZBrush extravaganza at Gnomon School, making use of the green-screen stage and classrooms to host all manner of presentations, workshops, sculpt-offs, and celebrations. Also streaming live around the world, the ZBrush Summit affords artists of all levels and all locations the chance to learn from their digital-sculpting heroes, win prizes, and most importantly: feel a part of the wider community. Our industry is a very special and very inclusive one, and we are lucky to have it. And events like this and those that Gnomon School puts on are helping us become closer. You can also catch frequent ZBrush Live sessions hosted all year round on Pixologic's Twitch account, and its YouTube channel is bustling with content, too.


EVENT SPOTLIGHT

# VIEW CONFERENCE 2017

We look forward to the upcoming event, happening 23-27 October in Turin, Italy

VIEW Conference is one of the events on the yearly circuit that offers its attendees a slightly different approach. Of course, it boasts a large number of exceptionally talented speakers, including Joe Letteri, and Oscar winners Paul Debevec and Hal Hickel, among many others. However it's not just the level of keynote speakers that there is to look forward to. VIEW has broadened its scope over the years and now there is something for anybody with even a passing interest in CG animation, from visual effects and games development to VR, which has had an explosive impact on the show season this year and looks to be here to stay.

"This year's VIEW Conference continues our traditions, while adding even more great speakers to our line-up to showcase games and virtual reality." These words from Dr Maria Elena Gutierrez, the show's director, echo what looks to be the overall feeling of VIEW 2017.

Many conferences and shows have an element of recognition for work undertaken in the months running up to it, be it the latest big studio release or a technology seen that pushes boundaries. What VIEW offers, though, feels more community-oriented, with the ability to enter your work as a short animation, something within a social context, or as an Italian project, helping to promote local talent. It's worth noting that the local authorities support the event, something not always seen elsewhere.

VIEW is rightly proud of the fact that over the week, speakers and attendees get to mix and mingle, removing the traditional barriers of the stage, letting people talk naturally, rather than simply listen, growing the event's appeal hugely.

If you are looking to end your year with a broad selection of talks and workshops from some of the biggest names in the industry, in a beautiful location, then head to Turin for VIEW, which promises to tick all the boxes and be inspiring as well as informative.

FYI *Discover more about the even at* **www.viewconference.it**

# FREE PLURALSIGHT COURSE

# SUBSTANCE DESIGNER FUNDAMENTALS

## Kick-start your texture creation skills

**ANOTHER BRICK IN THE WALL**
Learn how to create all the procedural textures needed for this material

The need for high-quality textures is one that will always play a part in your life as a 3D artist. Whether for games, TV, or film, models will need a renderable surface.

On occasion, a basic shader may suffice but sometimes the only solution will be to get your hands dirty and manually paint the textures you need. That is fine for a lot of the time, as a procedural texture will be the best fit for the task at hand.

On these occasions, Substance Designer can offer the tools to really help you get the job done but, as with any new software, you'll have a little learning to do. With that in mind, we have teamed up with Pluralsight to bring you this course on getting started with Substance Designer.

Substance Designer is being widely adopted by almost every AAA studio across the world. In this course, Substance Designer Fundamentals, you'll learn the most important basics of Substance Designer, creating a fully procedural tileable brick material. First, you'll explore how to set up a new project using templates, Substances project management as well as logistics solution. Next, you'll discover the most important nodes while creating your brick material, which can include anything from simple noises to tools for mapping and procedurally placing edge wear, dirt and grime. Then, you'll learn how to optimise your graph to be used in other applications. Finally, you'll cover exporting and saving out your textures. By the end of this course, you'll be comfortable navigating around Substance Designer and using the node-based system while having made your very first material.

No matter what 3D software you use, you will find this course of use, as you will learn how to export the exact files you need.

Software required: Substance Designer 5/6.

**FYI** *For more high-quality video training, visit Pluralsight at* **www.pluralsight.com**

**TUTOR**

**Karen Stanley**
Karen is an environment artist at Sony's London Studio working on PlayStation VR.

www.kazperstan.co.uk

PLURALSIGHT

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SOFTWARE REVIEW

# Reallusion iClone 7

**PRICE** £199.99 / $199 | **COMPANY** Reallusion | **WEBSITE** www.reallusion.com/iclone/


iClone 7 renders have reached unprecedented quality thanks to PBR materials and new visual features like IBL and GI.

**AUTHOR PROFILE**

**Adolf Navarro**

After studying production techniques, he was working on programming and technical 3D modeling. Six years ago, he started writing graphic novels and developing 3D animations.
www.antareus.com

## FEATURES

Use of PBR (Physically Based Rendering) materials

IBL (Image Based Lighting) and GI (Global Illumination) in real-time

Improved facial animation tools

Customisable LUT filters (Look Up Tables) for any cinematic style

Professional Camera Import / Export options

## BOOSTING PERFORMANCE

iClone 7 has a very short learning curve, disposes of plug-ins to connect with low-cost mocap devices and renders incredibly fast. Complex scenes can be easily animated and rendered in less than one second per frame at 4K resolution, even with the Global Illumination activated. It makes iClone 7 an interesting tool, that can certainly improve the production pipeline of any animation studio.

Since its earliest versions, iClone has enabled people with little, or even no, experience in 3D computer graphics, to start creating their own animations. Its intuitive and easy to learn interface, combined with its real-time render engine, avoided the need for long training periods and expensive hardware, offering a viable alternative for indie animators and fans of computer graphics.

With every new version, iClone has been adding new features and shortening the gap with professional animation applications. In this way, the recently released iClone 7 stands out, demonstrating a huge improvement in render quality and adding features usually reserved for applications that are much more expensive and difficult to learn.

iClone 7 supports PBR (Physically Based Render) textures. You can combine props and characters shaded with traditional or PBR textures in the same project, and you can also convert the old textures in PBR, as iClone 7 creates the new Metallic and Roughness maps from the original specular maps. You can tweak these maps directly in iClone 7 or use an image editor to get spectacular results.

An improved IBL (Image Based Lighting) enables you to use HDR images to illuminate and provide reflection maps to the scenes. You can bake your own HDR image using a dummy object usually placed in the middle of the scene, and you can also add HDR effects like blooms, tone maps or glares. Also, an improved Ambient Occlusion generator includes more controllers and an AO viewer that gives you absolute control of the AO shadows.

However, we think the best iClone 7 visual improvement is the use of GI (Global Illumination). When activated, iClone 7 considers not only the light emitted by the light sources, but the light reflected on the objects in the scene. The calculations, based in voxels, are performed extremely fast and provide rendering times of less than one second per frame, even rendering complex scenes at 4K resolution.

You can edit several GI parameters like the voxel's size, the light bounce strength, and the GI area of influence, in order to optimise the performance of your system.

iClone 7 has included even more visual improvements, like the light emissive materials that can illuminate the scene, using props or billboards texturised with images or videos that actually emit light. In this way, you can simulate the green sifted light that enters through a window facing a forest, just by placing a billboard with the forest image as texture in front

Above: iClone 7 can create very convincing ambient lights, using Global Illumination combined with LUT effects.

Far left: The new facial animation tools allow you to achieve any expression in an easy and intuitive way.

Left: Image rendered in less than one second at 4K, using just an Intel i7 PC with 16GB of RAM and a Radeon R9 graphic card.

## "iClone 7 comes with several predefined LUT (Look Up Table) filters, used to give a cinematic aspect to the scenes"

of the 3D room model, and activating the emissive feature for that billboard. In the same way, you can simulate a TV light flickering effect, just by applying a video of the TV show as texture to the screen of the 3D TV model.

The emissive light feature can be applied to the particles generated by iClone 7 as well, so explosions or sparks actually become light emitters. You can control the intensity of the illumination, but you have to keep in mind that these emissive lights cannot handle shadows, so you should use them in combination with traditional light sources to get a completely convincing effect.

iClone 7 comes with several predefined LUT (Look Up Table) filters, used to give a cinematic aspect to the scenes. You can create and add new LUT effects from the neutral template provided. The process is amazingly simple, but it involves external image editors like Photoshop. You can mix several LUT effects on the scene, setting the contribution of each one to the global aspect.

Besides the visual improvements, iClone 7 has included features like the morph editor, which enables you to include shape deformation keys in the timeline of any element of a project. The modified shapes have to be previously created using an external modelling tool like 3ds Max, but then, you can collect the modified shapes in the morph editor and apply them to the object at any moment of the project.

Also, the facial editing tools have been dramatically improved. Before, if you weren't able to get some facial expressions on the iClone characters, now, with the new Expressions tool and facial morphs, you can achieve any character's face in the easy and intuitive way of iClone.

Finally, it is now possible to import camera movements and settings from other applications like Maya. The new camera editor also includes camera settings from pro cameras like Arri-Alexa or Red, facilitating the integration of the rendered sequences with real footage recorded with those cameras.

Considering all you get for its price, iClone 7 has no rival. It's a must-have app for anyone that wants to start creating 3D animations, as well as for professionals looking to improve their animation production pipeline.

VERDICT

AUTHOR PROFILE
James Morris
James has been writing about technology for two decades, focusing on content creation hardware and software. He was editor of PC Pro magazine for five years.
www.webmediology.com

HARDWARE REVIEW

# Armari Magnetar S16-TRT1000G2

BEST IN CLASS 3D WORLD

**PRICE** £3,795 plus VAT | **COMPANY** Amari | **WEBSITE** www.amari.com

The Armari Magnetar S16-TRT1000G2 is a hugely powerful system for the money, thanks to its Ryzen Threadripper processor.


## FEATURES

3.4GHz AMD Ryzen Threadripper 1950X clocked to 4GHz

64GB 3,200MHz DDR4 SDRAM

AMD Radeon Vega Frontier Edition graphics with 16GB HBM2 memory

480GB Kingston KC1000 M.2 NVMe solid state disk; 4TB Western Digital GOLD Datacenter 7,200rpm SATA hard disk

Warranty: 3 Years Parts and Labour, 1st Year Collect and Return

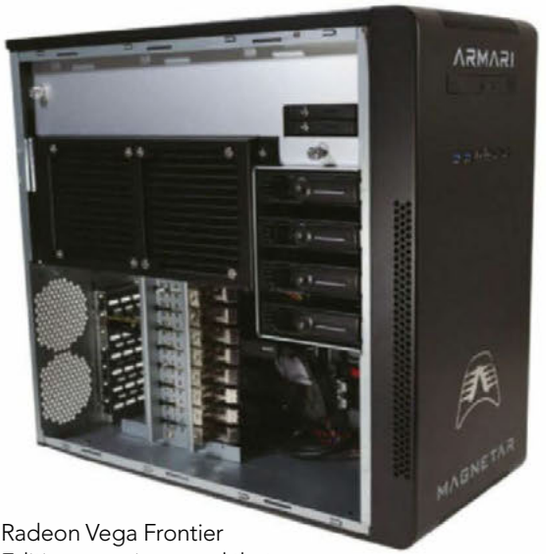
AMD has already made quite a splash with the introduction of its Ryzen 7 processor, but we always knew even more was on the horizon. The Ryzen Threadripper has been one of the most anticipated processor releases in years, and it has significant implications for the 3D content creation market. Illustrating this very persuasively is the Armari Magnetar S16-TRT1000G2 we have on test this month.

The Magnetar is based around the current top Ryzen Threadripper 1950X. Unbelievably, this processor has 16 cores, each one capable of running two threads for a whopping total of 32. The base clock is 3.4GHz, with a top boost mode of 4GHz, or 4.2GHz in XFR mode. There's also a lesser Ryzen Threadripper with 12 cores, called the 1920X, and an eight-core version called the 1900X that hasn't arrived on the market yet.

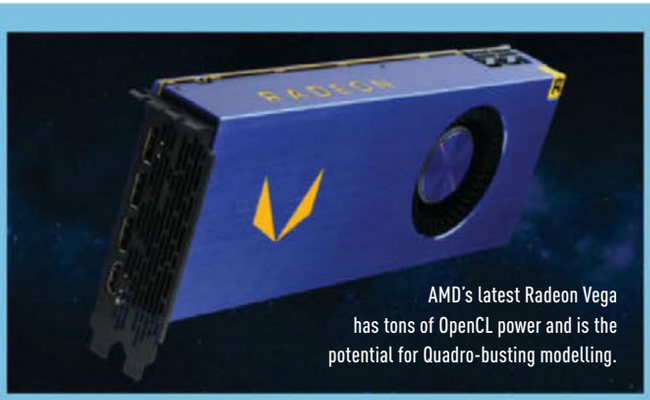
Right now, Intel's Core i9 stops at ten cores, although the 12-core version is just arriving, with more to come. All of these will be more expensive than the 16-core Ryzen Threadripper 1950X, however. The Ryzen Master software also means you can tune the Threadripper for different usage scenarios, such as Creator and Game modes, and you can set up your own profiles as well. Armari has permanently set its system to 4GHz across all cores, with custom water cooling to control the temperature.

The CPU is backed by a very healthy 64GB of 3,200MHz DDR4 SDRAM, although it was running at 2,667MHz in our sample. This was supplied as four 16GB DIMMs, leaving four slots free for upgrade to the system maximum of 128GB. You probably won't need to do that for a while, though, as 64GB will be plenty for most professional content-creation activities for some years to come.

Another brand-new AMD product can be found taking care of graphics acceleration. This comes in the shape of the




The Armari Magnetar chassis includes custom water cooling for the processor, four 3.5in and two 2.5in hot-swap drive bays.




AMD's latest Radeon Vega has tons of OpenCL power and is the potential for Quadro-busting modelling.

## THE WILD FRONTIER (EDITION)

AMD's first taste of its new Vega GPU sits somewhere between professional and consumer, although it's officially within the Radeon Pro range. The Radeon Vega Frontier Edition differs from other Radeon Pros by only coming with a single-year warranty, although it still has professional software accreditation. The specification is hefty, though, with 4,096 Stream Processors running at 1,382MHz and 16GB of the brand-new HBM2 memory running at 945MHz on a 2,048-bit interface, for 483GB/sec of bandwidth. So on paper the AMD Radeon Vega Frontier Edition is a serious contender.

Radeon Vega Frontier Edition, a curious card that offers gaming drivers and modes as well as professional modes that are accredited to run professional software. This card is a little pricier than an NVIDIA Quadro P4000, but promises performance to match the P5000 in some areas, and absolutely storming GPGPU rendering with OpenCL.

The storage takes the familiar approach of a solid-state disk for operating system and applications, plus a regular hard disk for more general data. Both are superb. The Kingston KC1000 SSD is a NVMe M.2 unit with 480GB, which can read at close to 2,700MB/sec and write at 1,600MB/sec, while the Western Digital GOLD Datacenter hard disk may be just a 7,200rpm SATA unit, but it has 4TB capacity and reads or writes at over 200MB/sec. So you get immense speed for boot up and software loading, plus loads of space for the content you're working on.

Armari has also included an 8x LiteOn slimline DVD-RW, and there's plenty of room for more storage. One of the added benefits of Ryzen Threadripper is that it has 64 PCI Express lanes – 20 more than Intel's top Core i9 processors. So the Armari's ASRock motherboard has three M.2 NVMe SSD slots rather than one. The Armari chassis also has four 3.5in and two 2.5in hot-swap drive bays, providing plenty of space for regular storage expansion.

When it comes to performance testing, the AMD Ryzen Threadripper is in a class of its own. The Maxon Cinebench R15 rendering score of 3,346 is way beyond any single-socket system we have seen before, and close to Intel Xeon dual-socket workstations costing £10,000 or more. You get a huge amount of rendering power for your money.

"THE RYZEN THREADRIPPER... HAS SIGNIFICANT IMPLICATIONS FOR THE 3D CONTENT CREATION MARKET. ILLUSTRATING THIS VERY PERSUASIVELY IS THE ARMARI MAGNETAR S16-TRT1000G2"

The Ryzen Threadripper's modelling abilities are a little less outstanding, although there are still some great results. The Maxon Cinebench R15 OpenGL score of 136.99 is decent, but no match for the latest NVIDIA Quadro P4000. On the other hand, with SPECviewperf 12.1, the 3dsmax-05 result of 151.58 will beat a more expensive P5000, as will 20.6 in energy-01, 85.84 in medical-01, and 108.37 in showcase-01, whilst 116.52 in maya-04 isn't far off either. However, the catia-04 score of 144.43, 93.43 in creo-01, 148.5 in snx-02 and 118.07 in sw-03 are behind a P4000.

In other words, the graphics performance really depends on what software you are running. The Radeon Vega's OpenCL abilities are unquestionable, however, with 4,822 in LuxMark 3.1, which isn't far off what NVIDIA's £5,000 Quadro P6000 can muster. If you're going to try out AMD's ProRender plug-in for Blender, Maya, 3ds Max, SolidWorks or Cinema 4D, this will be a very powerful and cost-effective option.


The AMD Threadripper CPU packs in a huge number of cores for the money, making it a monster for rendering and encoding tasks.

The Armari Magnetar S16-TRT1000G2 is a great showcase for what AMD's Ryzen Threadripper is capable of. Its rendering capabilities are well beyond any current single-socket option from Intel, and close to dual-socket systems costing twice as much. AMD is back in the workstation market, with exciting implications for how much rendering power you can get for your money.

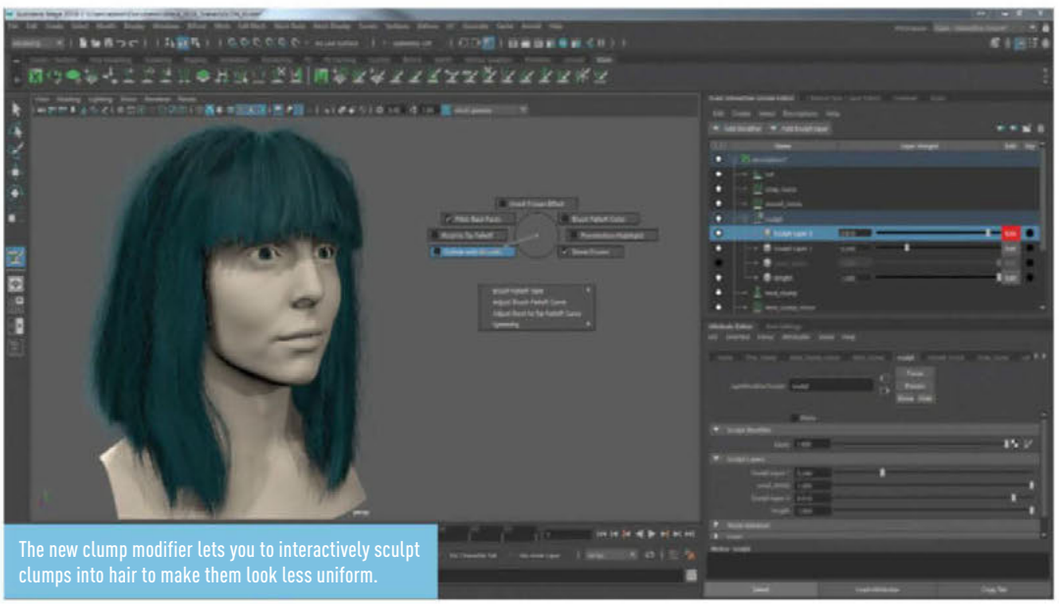
VERDICT

SOFTWARE REVIEW

# Autodesk Maya 2018

AUTHOR PROFILE
Antony Ward
Since the early 90's Antony has worked for many of today's top game and VFX studios, in addition to writing three technical manuals and many online tutorials.
www.antcgi.com

**PRICE** £204 per month / £1644 per annual subscription | **COMPANY** Autodesk | **WEBSITE** www.autodesk.co.uk



The new clump modifier lets you to interactively sculpt clumps into hair to make them look less uniform.

## FEATURES

- Hundreds of bug fixes
- UV Editor workflow improvements
- After Effects Live Link
- MASH Dynamics Node
- Enhanced Look Dev workflow

## UV EDITOR IMPROVEMENTS

The UV Editor has also benefitted from an upgrade, making UV manipulation much faster and more intuitive. You can enjoy additions to help automatically generate seams, unfold and layout your shells, base the shell scale on 3D space and full symmetry support. Add to this the viewport enhancements like visible UV seams, and you will be creating and texturing models faster than ever before.

When Autodesk released Maya 2017, it received a mixed reception. In many ways this was due to the company dropping support for Mental Ray and instead focusing on Arnold, (which is now fully integrated into Maya 2018). This was always on the cards; Mental Ray was quickly feeling dated and users were swiftly moving to external plug-ins like V-Ray, so Autodesk had no choice but to do something if it wanted to offer customers an improved rendering experience.

Shortly after, Autodesk released Mental Ray as a standalone plug-in, which you could download and add yourself if needed.

With the release of Maya 2018, Autodesk has again divided the community. This time, however, the issue seems to be the lack of any major new features, rather than the removal of existing ones.

With that said, the legacy viewports have now been removed, leaving your only option being Viewport 2.0, which is another bone of contention among users. You can, however, add the legacy viewports back via the environment variable MAYA_ENABLE_LEGACY_VIEWPORT, although performance has been improved in Viewport 2.0 to such a level where you shouldn't need to.

Don't get us wrong, people making the leap from 2017 or earlier, to 2018 have a lot to be excited about. Maya 2018 does feel like more of a stability and productivity release, with most updates focused on fixing hundreds of bugs and improving existing tools. This is actually great news. With Autodesk spending time fixing and enhancing what it already has, it means your workflow should be smoother. Surely this is better than adding a feature you may not use?

Even with the lack of new features, there is still plenty to be excited about. Almost every aspect of Maya has had a wave of the Autodesk wand to the point where there are just too many improvements to list, however there are some key tools which will make your 3D life easier.

Modelling workflow has been enhanced with the introduction of the interactive Extrude and Slide tools. Simply hold Shift and move your selected faces to extrude them, holding Shift and Control will instead slide the geometry over the surface of the model. It's a small thing

and something that has existed in other applications for a while, however it's nice to see it finally be implemented because it will save a lot of time.

You can also quickly create a circle in your geometry with the new Circularize tool, which is neat, but again nothing new. Symmetrize is a nice new addition, making your model symmetrical. In practice this works well, however it would have been nice if it also updated topology changes, too.

Rigging is another area where improvements have been made. For example, building upon the Controller options added previously, which allowed custom pick walking, you can now set the controller's visibility to only show when the mouse pointer is close to it. This addition results in a much cleaner rig for animators.

Other improvements include the additions of Dash Scripting, a Curve Wrap Deformer and full Arnold 5 support, not to mention MASH dynamics and Look Dev additions to improve your rendering workflow. The list goes on.

"YOU CAN NOW SET THE CONTROLLER'S VISIBILITY TO ONLY SHOW WHEN THE MOUSE POINTER IS CLOSE TO IT. THIS ADDITION RESULTS IN A MUCH CLEANER RIG FOR ANIMATORS"

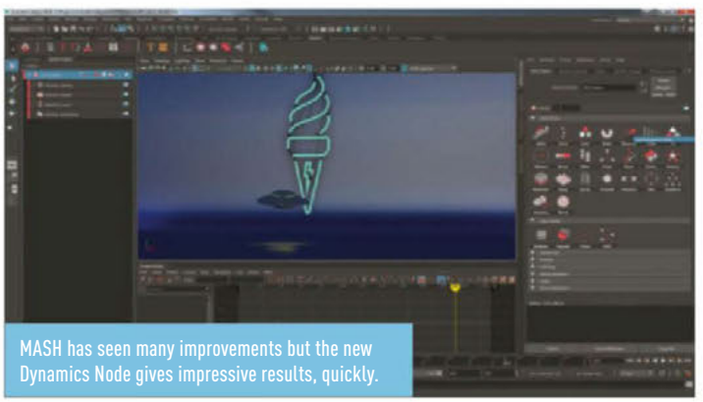
What would we have liked to see? The Node Editor could use some work as it still feels clunky compared to the likes of Houdini and Blender. It's an editor that a lot of people probably find themselves using more and more, especially when building complex rigs, so anything which can make the experience smoother is surely an improvement.

One complaint about Maya that surfaces year after year is how difficult it can be to navigate the menus, so it would have been nice to have seen a quick menu option.

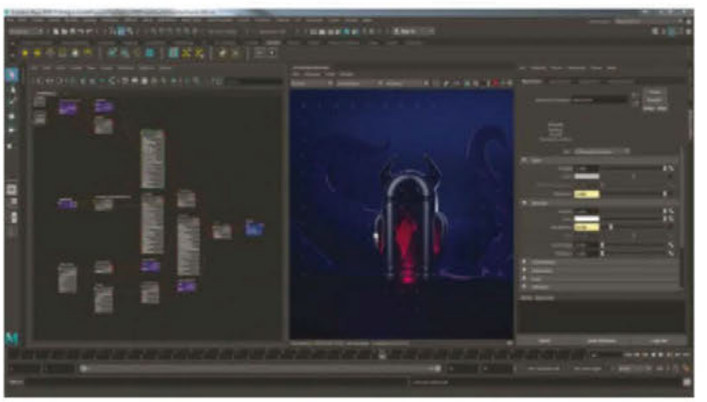
As you can tell from this review, Maya 2018 is a bit of a mixed bag but all in all, it feels like it's a step in the right direction. Having a more stable release with enhancements to overall workflow is a great thing, although we are not sure we needed to wait for a full release for them.

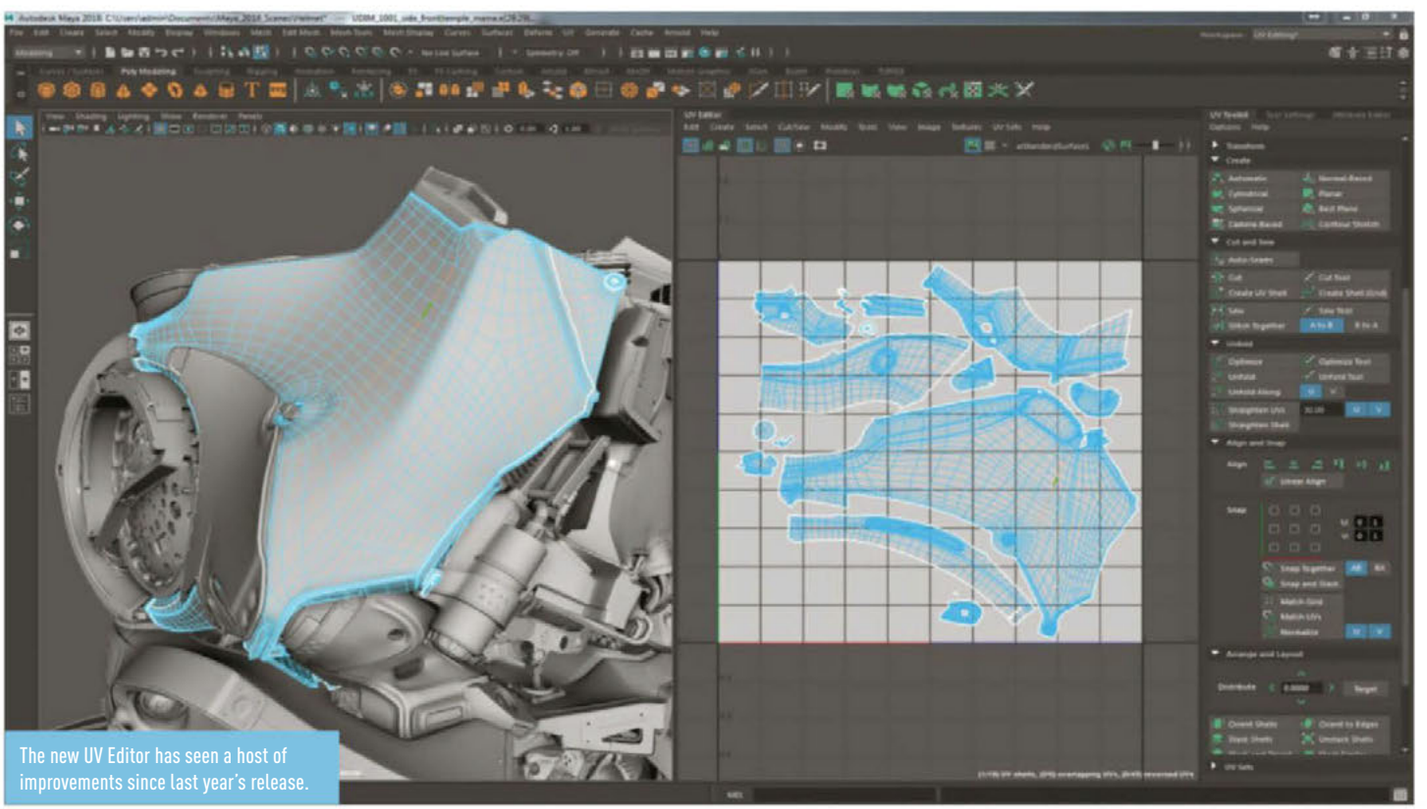
Maya 2018 does feel more like an update rather than a full release but if you're looking to increase your productivity and streamline your workflow, the upgrade is well worth it. However, if you're happy with what Maya 2017 has to offer, you may not want to rush out and upgrade just yet.

**VERDICT**



MASH has seen many improvements but the new Dynamics Node gives impressive results, quickly.





The new UV Editor has seen a host of improvements since last year's release.

IN THE VAULT

# FREE RESOURCES

**FREE**
This issue we have a free video course from Pluralsight, teaching the basics of Substance Designer

Follow the link to download your free files
**www.bit.ly/vault-227-legend**

## VIDEO & FILES

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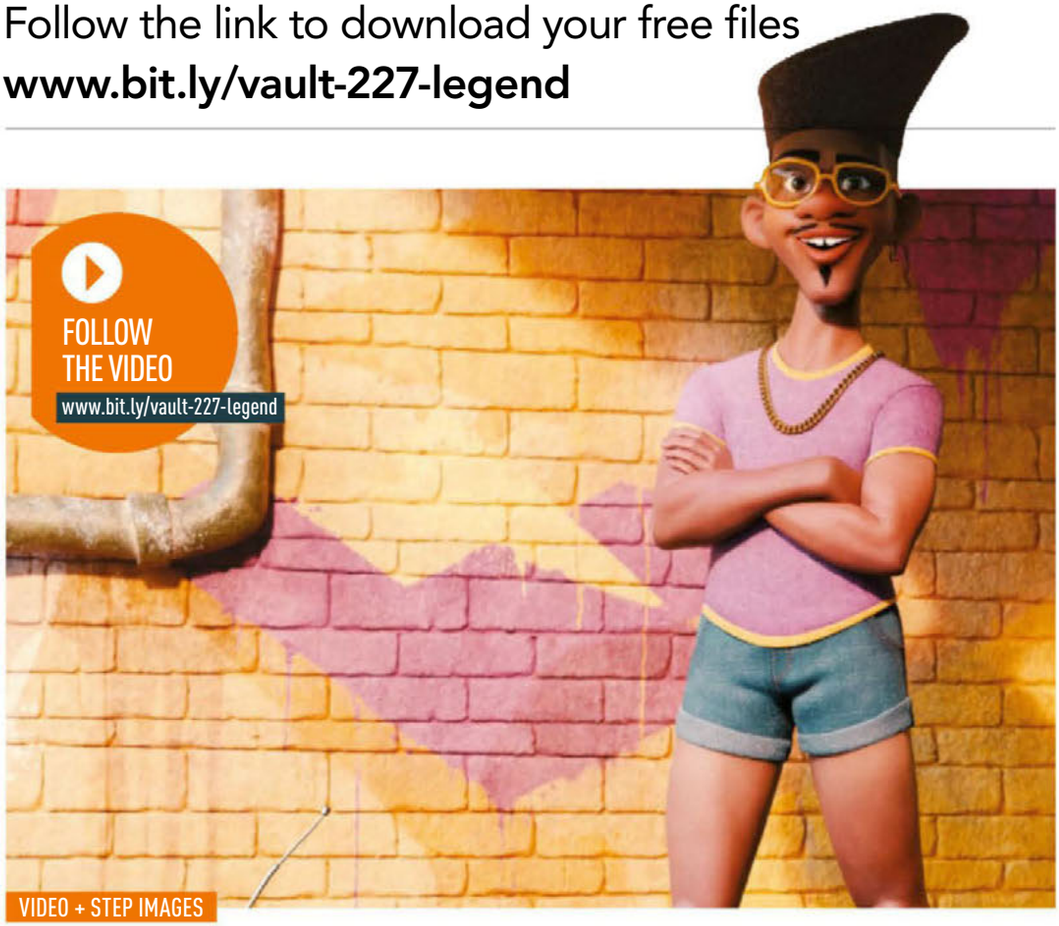


### DESIGN A CHARACTER FROM SCRATCH
Pedro Conti shares his secrets for designing a character from scratch and bringing them to life.


### BOOTCAMP – MASH
In this issue's bootcamp, we take a look at one of the most useful and powerful modules for Maya: MASH.


### MARVELLOUS AVATARS
Simon Edwards shows you how clothe and pose your figures.


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| NVIDIA Quadro P5000<br>VCQP5000-PB | VR READY | NVIDIA Quadro P600<br>VCQP600-PB | |
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